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THE NAVAL ANNUAL

LORD BRASSEY

K. C. B.

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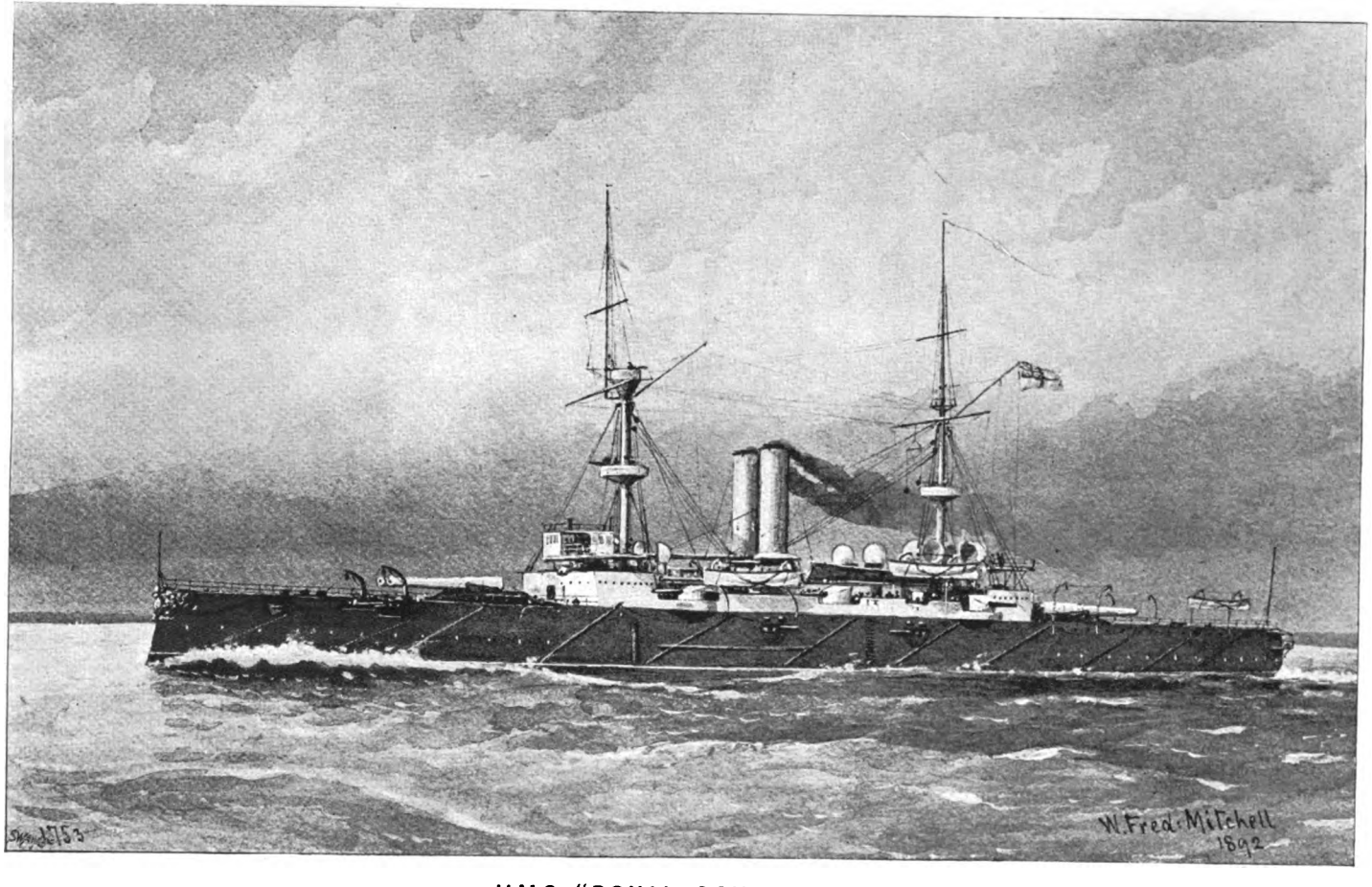

H.M.S. "ROYAL SOVEREIGN."

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THE

NAVAL ANNUAL,

1892.

EDITED BY

T. A. BRASSEY, B.A., F.R.G.S.

PART I.—EDITOR, E. WEYL, J. R. THURSFIELD, F. K. BARNES, R. C. OLDKNOW, H. O. ARNOLD-FORSTER, W. LAIRD-CLOWES.

PART II.—F. K. BARNES, M.I.N.A.

PART III.—Captain ORDE BROWNE, late R.A., Lecturer on Armour to R.A. College.

PART IV.—STATISTICS, TABLES, OFFICIAL REPORTS.

PART V.—LORD BRASSEY, K.C.B., M.A., D.C.L., Commander of the Legion of Honour.

"Nil actum credens dum aliquid superesset agendum."
CÆSAR.

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PREFACE.

THE *Naval Annual* for 1892 has been prepared for publication in the absence of Lord Brassey on a foreign cruise. The contributions from various writers of authority on naval subjects are a new feature in the present volume. We believe that our readers will appreciate the valuable assistance we have received from Messrs. Weyl, Thursfield, Oldknow, Arnold-Forster, and Laird-Clowes. Mr. Weyl's chapter was received early in January, but no pains have been spared to bring it up to date, both from information supplied by him and from other sources. Mr. Barnes, as in former years, is responsible for Part II., and contributes a chapter on Shipbuilding to Part I. We regret that, in spite of every effort, it has been impossible to obtain plates of the newer Russian armourclads. Part III. continues in the able hands of Captain Orde Browne. Part IV. is somewhat increased in size, owing to the printing of documents relating to the disbandment of the Naval Volunteers, and the lengthy though abridged Report of the Secretary of the United States Navy. As in former years, we owe much to the naval correspondents of the public press. Part V. contains Lord Brassey's contributions, which were not received until after the rest of the volume was in the press.

The price this year has been slightly increased. No further economies in production are possible without materially altering the character of the book. If it is to be a permanent publication, the price must approximate more nearly to the cost of production.

In offering the Sixth Volume of the *Annual* to the public, the Editor asks for some allowance to be made for the peculiar difficulties under which he has laboured in the absence of the compiler of former volumes.

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ERRATUM.

Page 120, 21 lines from the top, *for* "120,000 square feet," *read* "20,000 square feet."

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PART I.

CHAPTER I.

Progress of the British Navy in 1891–92.

The *Naval Annual* for 1892 would be incomplete without a brief summary of the chief events in the history of the British Navy during the past year. Mr. Weyl only reviews the progress of foreign navies. The period covered by the *Naval Annual* is practically identical with the financial year.

The progress of construction first demands our attention.

Ships completed in dockyards.

We are informed in the Explanatory Statement issued with the Navy Estimates, that of the ships building in the dockyards eight have been completed. These include the second-class cruisers Apollo and Andromache and the torpedo gunboats Gleaner and Gossamer, building under the Naval Defence Act; and the third-class cruisers Pallas, Pearl, Philomel, and Phœbe.

Blake, Blenheim, and Vulcan.

The most important additions to the Navy during the year have been three vessels of the old programme: the cruisers Blake and Blenheim, of 9000 tons, and the torpedo depôt-ship Vulcan, of 6620 tons. The machinery and boilers for these three fine vessels had been unfortunately determined upon before the Admiralty had become convinced of the fact that more space and more weight must be allowed for engines and boilers if the estimated speed even under modified forced draught was to be realised. The trials of all three vessels have consequently to some extent been disappointing. The speed under natural draught was attained, and more than attained, both in the case of the Blenheim * and that of the Vulcan; but after one attempt it was decided not to try the vessels with forced draught, and they were accepted from their contractors after their natural draught trials. The Blake has been commissioned as flag-ship on the North American Station. The trials of all these vessels are described in a later chapter by Mr. Oldknow.

Australian Squadron.

The five cruisers and two torpedo gunboats of the Australian Squadron were completed in the summer of last year, and safely

* 20·4 knots mean speed on eight hours' trial.

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reached their destination. Their arrival was greeted with considerable enthusiasm in the capitals of the different colonies which they visited in succession; and Queensland, which has hitherto held aloof, has now agreed to bear her proportion of the cost of the maintenance of the squadron. The completion of these vessels is an important event in the history of the British Navy, which will for the first time possess the character of an Imperial Force.

Second-class cruisers.

Of the seventeen second-class cruisers to be built by contract eleven have been handed over by the contractors during the past year. The first of this class, the Latona, was sent to Malta and back for an experimental cruise. Between Gibraltar and Malta she made 16¾ knots for 24 hours, the highest speed attained on the voyage; but on her forced draught trials a speed of 20 knots was easily realised with an air pressure of 1 in. The trials of the Indefatigable, Pique, Melampus, Spartan, Sirius, Naiad, Terpsichore, Thetis, and Tribune, as well as of the second-class cruisers built in the dockyards, have been no less successful. The average horse-power obtained by eleven ships was 9190, against 9000 estimated. The Spartan attained a speed of 20·44 knots with 9205 horse-power.

Ships launched and completing.

During the year 1891–92 fifteen ships, of 107,400 tons displacement, have been launched, as compared with nineteen ships, of 60,860 tons, in 1890, and thirty-one ships, of 51,110 tons, in 1889.

Battleships.

All the four first-class battleships building in the dockyards have been launched. The Royal Sovereign, which was launched in 1890–91, is expected to be ready for commission on May 31, two years and eight months from the day her keel was laid. This unprecedented rate of construction has been secured by concentrating the energies of Portsmouth Dockyard upon her throughout the period of her construction, and cannot be considered as normal. The Empress of India has steamed round from Pembroke to Chatham, where she and the Hood are completing for sea. The Repulse was launched at Pembroke on February 27, 1892. Of the four battleships building by contract the Ramillies was launched on the Clyde on March 1. The remaining three will be launched in the course of the spring and summer.

First-class cruisers.

The last of the four first-class cruisers building in the dockyards, the Crescent, was launched on March 30th. The Edgar, Hawke, and Royal Arthur will be completed in 1892–93. The Edgar has passed through her trials. She attained a speed of 20·97 knots under forced draught, and 19·25 knots under natural draught, as against estimated speeds of 19·75 and 18·25 knots respectively. The Hawke attained a speed of 19½ knots under natural draught. Of the

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five first-class cruisers building by contract two have been launched, the Endymion and the Grafton.

The two second-class cruisers Æolus and Brilliant have been launched at Devonport and Sheerness respectively, and will be completed in 1892–93. The remaining six of the seventeen second-class cruisers building by contract have also been launched, and will be completed before April 1893. Second-class cruisers.

Four of the twelve torpedo gunboats building in the dockyards, the Alarm, Antelope, Circe, and Leda, though not yet launched, will be completed in 1892–93. Torpedo gunboats.

There remain on the stocks in the dockyards two second-class battleships, eight second-class cruisers (Astrea class), one first-class cruiser, and six torpedo gunboats, which, the First Lord estimates, will be completed without difficulty in 1893–94. Three first-class battleships, three first-class cruisers, and six torpedo gunboats, building by contract, are still on the stocks, and will not be completed until after 1892–93. In construction.

Five ironclads of the older type, namely, the Hercules, Devastation, Rupert, Téméraire, and Ajax, are to be finished in 1892–93, and two more, the Sultan and the Monarch, are to be advanced sufficiently to be finished in 1893–94. Re-construction.

The First Lord in his memorandum puts forward a moderate programme of new construction, which includes three first-class battleships and ten first-class torpedo-boats. Particulars of the former will not be supplied till later in the year, but the dimensions, we are told, will not exceed those of recent first-class battleships. New programme.

During the past year eleven unarmoured vessels of modern, if not recent, construction have been removed from the effective list. These include the Shah (1873), the corvettes Opal (1875), Sapphire (1874), and Turquoise (1876)—two of this class are still doing duty on the North American Station; the sloops Dragon (1878), Miranda (1879), and Pegasus (1878); the gun-vessels Algerine (1880) and Ranger (1880); and the gunboat Swinger (1872). Vessels removed from effective list.

The numbers of the *personnel* are to be increased this year from 71,000 to 74,100, and next year a further increase of 2000 men will be necessary. It may well be doubted whether this increase is sufficient. We have plenty of men to man the ships that are in commission in time of peace, but on the outbreak of war it would be difficult, if not impossible, to find complements for all our available ships—taking into consideration the fact that a considerable proportion of the Naval Reserve would be required for service on board merchant cruisers, and a large number would not be immediately available. Personnel.

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Naval Reserve.

The numbers of the Naval Reserve are increased this year to 23,500 (officers and men), as compared with 18,300 in 1886. In this connection it is satisfactory to note the gradually increasing number of officers who take advantage of the opportunity of a period of service on board H.M. ships.

Naval Volunteers.

The decision to abolish the force of Royal Naval Volunteers, as at present constituted, will be received with regret in many quarters. By placing those of the force who choose to remain connected with it under the control of the War Office, the main inducement to enlistment—the Englishman's love of the sea—is removed.

Naval manœuvres.

The period allotted to the Naval Manœuvres of 1891 was employed mainly in tactical evolutions. But little attempt was made to solve strategic problems, as had been the case in former years. Valuable lessons have been learnt as to the best formation to be adopted in the varying conditions of naval battle. What these are we do not know. It is generally understood, however, that the Naval Manœuvres of 1891 have proved that the secondary armament of quick-firing guns will play an even larger part in the battles of the future than was originally supposed. Englishmen may congratulate themselves that the British Navy is more amply provided with these weapons than the navies of other Powers. We were slow to adopt the breech-loader, but France has only just commenced to introduce the quick-firing guns into her Navy. In the operations in St. George's Channel the anticipated attack of torpedo-boats was for the first time met by offensive measures.

Sims-Edison torpedo.

Last year a brief account was given of the experiments with the Brennan controllable torpedo. The following description of the Sims-Edison torpedo, and some experiments which took place with it at Portsmouth in the presence of the Duke of Connaught and members of his staff, is taken from the *Times*:—

"Roughly speaking, the engine may be described as consisting of two cylindrical copper bodies, namely, the float and the torpedo proper, which are connected together by stanchions. The former resembles in form the hull of a miniature yacht with fine lines, and subserves the double purpose of enabling the operator to direct the movements of the torpedo by sight, and of floating the latter, which is not in itself buoyant, at an unvarying degree of immersion. The float is packed with compressed cotton, which would exclude the water if struck, and renders it practically indestructible by quick-firing guns when moving at great speed. Below this, at a depth of about 6 ft., is the torpedo, which is cigar-shaped, with a pointed head, and closely resembles in outline the old-fashioned Whitehead.

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It measures 31 ft. in length, with a *maximum* diameter of 20 in., and is composed of four sections connected by gun-metal rings and wedge-locking pieces, and rendered water-tight by indiarubber joints. Together torpedo and float weigh about 1½ tons. The first compartment contains the charge, amounting to 500 lbs. of explosive, which is believed to be effective at a distance of 30 ft. or 40 ft. from the target. In the second compartment is stored the electric cable, which is unwound from the centre like a ball of twine, and passes through a hollow fin on the belly of the structure to the operating station ashore or afloat, as the case may be. As it is paid out by the torpedo in running it is never at tension, but is deposited on the bottom out of reach. When it is discharged from a ship additional freedom is secured by paying out from both ends. The cable is of Silvertown manufacture, and contains two conductors, an annular one which carries the dynamo current for working the propeller motor, steering the torpedo ahead and exploding the charge, and a central one attached to a secondary battery for deflecting the relays in connection with the electro-magnets which actuate the rudder. In order to secure the necessary flexibility the principal conductor is made up of no fewer than 135 minute strands or filaments, completely insulated. Section three contains the Edison motor, which supplies the place of compressed air in the ordinary Whitehead, and, while avoiding the danger arising from explosion through shot, dispenses with all air-compressing machinery. It consists of what is technically known as a two-pole series-wound motor, capable of making 1600 revolutions a minute, and of developing 33 horse-power. The fourth and last section contains the shaft for working a two-bladed propeller and the electrical gear for controlling the rudder, which is fitted on the top of the projectile at the rear, and, when not deflected to right or left by the electro-magnets, is kept amidships by the passage of the torpedo through the water.

"As soon as the company were put on board from a submarine miner at Spithead, the Drudge made for the shelter of Fort Monckton, for, although the day was fine, the previous day's storm had left a nasty loppy sea behind. Mr. Sims received his visitors at the gangway and explained his launching-gear. This consists of an overhead inclined rail, on which the torpedo and float are suspended, and along which they are carried on rollers by gravitation until the torpedo reaches the end of its travel, when it is automatically tripped and enters the water with a plunge. The visitors were afterwards conducted to the manœuvring station at the port end of the bridge, where the electrical instruments are arranged. These consist of a

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secondary cell battery, the switches for manœuvring the torpedo, and a voltometer and an ammeter, which show the tension and amount of the current, and by excess of pressure, when the projectile has come in contact with the object aimed at—the supreme moment when the charge is to be exploded by reversing the main current and sending it by means of a relay to the detonator in the fore compartment. Shortly before three o'clock the torpedo had been cleared for action, and the throbs of the dynamo below indicated that all was in readiness for the run. After a few preliminary revolutions of the screw Mr. Sims gave a turn to the switch, and the engine spun down the rail and entered the water with a bound which carried it some depth below the surface, and started off in the teeth of the wind. The Drudge, which had already begun to move in a leisurely fashion, now commenced to pay out its 3000 ft. of cable, so that, having despatched the torpedo against an imaginary enemy, she sought in this way to escape the enemy's guns. The torpedo went on its way deliberately at first, a turn of the switch to the right directing it to the right, and a turn to the left sending it in an opposite direction. After exhibiting its amenability to control, the torpedo was then made to make an almost complete tour of the ship and with accelerated speed.. Owing, however, to a defect in the dynamo shaft, which reduced the current to 17 ampères instead of 30, and to 750 volts instead of 1200, the speed at no time reached its previous achievements, when an estimated speed of 20 knots was realised. The whole time from launching to stop was six minutes, so that, with the known length of wire deposited by the torpedo in its course, the approximate speed was something like 13 knots. The demonstration, however, was sufficient to show that the torpedo was capable of being made a formidable engine of warfare, and to satisfy the visitors that its importance for the purposes of defence ought not to be lost sight of."

It is improbable that the Sims-Edison torpedo can ever be largely used in a Navy which is destined to take the offensive, but it is capable of further improvement, as the following extract from the same account shows :—

"Neither is the torpedo itself all that could be desired. Originally designed for shore purposes, it has been in use for four years. Its attachments with the float are rigid, the central standard springing from an external belt which impedes the way of the torpedo through the water. In the improved weapon the stays are hinged, so that when launched it is compressed into 3 ft. in depth instead of 6 ft. The diameter of the cable, again, admits of only 7000 ft. being coiled

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inside the torpedo; but Mr. Sims is preparing a cable which, while more efficient than the present cable, will enable him to coil in the same space 4600 yds., or, in other words, more than two miles and a half."

Visit of French Fleet.

The French Fleet, including the ironclads Marengo, Marceau, Requin, and Furieux, visited Portsmouth in August, and the greatest exertions were put forth on all hands to make the visit a pleasant one to Admiral Gervais, his officers, and men.

Naval Exhibition.

The Naval Exhibition, which is fully dealt with in a later chapter by Mr. Arnold Forster, was successful beyond all anticipation. It has done much to arouse a more general interest in the Navy, while the works of Captain Mahan, Admiral Colomb, and Sir Charles Dilke have given to many a wider grasp of the principles which govern naval warfare. It is to be hoped that the result will be the formation of a more healthy public opinion on the part which the Navy ought to play in the defence of the Empire.

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CHAPTER II.

The Progress of Foreign Navies.

INTRODUCTORY.

In estimating the progressive development of the war-fleets of the world, we must take into view, as the three principal factors, the number of ships launched, the results of their trials, and the number of ships laid down. The task is rendered more difficult and complicated because the strength of fleets depends on efficiency of type no less than on numbers and tonnage.

Ship of war rapidly becomes obsolete.

It has often been seen in the history of naval construction that a ship of war, although regarded at the time when she was laid down as capable of satisfactorily meeting all reasonable requirements of fighting efficiency, has been condemned as already out of date, according to the newest ideas, at the time when she has been launched, and that when at length ready to undergo her trials she has been put aside as obsolete. The truth is, that a ship of war is a machine of extreme complexity, always undergoing modifications rendered necessary by the continuous progress of many sciences. However great the care to keep abreast of the newest discoveries, the expectations formed of the capabilities of novel types are often disappointed. It is an obvious remark that new patterns of guns, torpedoes, or projectiles, new descriptions of armour suggested by metallurgical discoveries, new metals for use in the construction of the hulls of ships, and novel and possibly valuable modifications in propelling machinery, can only be accepted by the naval constructor as improvements after they have been seriously tested.

As we look back on the rapid progress of science in its application to war, the reasons are not far to seek why a fighting ship, in the long interval which has too often elapsed between the production of the first design and the final completion for sea, has ceased to fulfil the desiderata of the hour. In order, therefore, to arrive at a proper appreciation of the state of any navy, it is necessary to measure the efficiency of ships already built in the light of the

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various considerations which have been put forward. It will be necessary not less to examine how far the ships in construction seem likely to realise the ideas which at present are most in favour.

Difficult as it is to deal adequately with the ships which have been laid down, which have undergone their trials, or which have been put in commission, it is yet more difficult to discuss programmes before they have been the subject of official publications or official utterances. Happily for the present purpose the great centres of maritime enterprise are comparatively few, and most navies follow the lead of one or two naval Powers. The problem before us is not, therefore, so vast as it appears at first sight; and as its solution depends above all on ideas which are freely discussed in free countries, we may with close attention and continuous labour form a fairly just appreciation of the policy of the leading maritime Powers.

Navies are maintained with definite object.

And here it may be appropriately observed that navies are generally maintained with a definite object, some to take the offensive, some to take the defensive, according as they belong to the larger or the less powerful maritime states. The general aim and policy being different, the general organisation and programmes of shipbuilding will be found to differ widely in different countries. Thus it seems to us on the Continent that England, being resolved to preserve her preponderance at sea, devotes a comparatively small expenditure to the defence of her coasts. The reason is that she depends on her noble Navy to protect the immense interests which she has at stake in every part of the world. France, on the other hand, which still possesses the second navy, undertakes heavy burdens to ensure the safety of her own coasts and those of French Africa. For a like reason much attention is given to increasing the torpedo-boat flotilla. So, too, in Germany and in Italy the construction of large battleships and of torpedo-boats is in both cases a prominent feature of the shipbuilding programme. In the United States more attention is now paid to the sea-going fleet than to coast defence, which tends to show that they are preparing to assume the offensive, and have little fear of attack on their own shores. In short, every country in deciding what its naval programme is to be takes into account its political and geographical situation, its alliances, and the state of its finances.

Importance of rapidity in construction.

Whatever the line of policy pursued it is equally an absolute necessity for every naval administration to build as rapidly as possible. The progress of science is to-day so rapid that it is of extreme importance not to allow a vessel to be so long in construction

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as to become out of date in the interval between the commencement of building and the final completion for sea. Inferiority of industrial resources, inferior skill on the part of the workman, defective organisation of the dockyards, make the rate of construction much slower in some countries than in others. England holds without question the first place in productive energy; the United States, though her shipbuilding yards have been but lately established, is not far behind. In France a marked improvement has been shown in the rate of construction, the result being due rather to a reduction in number of ships building than to the more effective application of labour. The German Empire is making progress in the same direction, and when her system of administration has been perfected, we may be sure that her Navy will advance with rapid strides. In Italy the financial situation appears to be producing an effect on her rate of construction. In Russia great efforts are being made to provide the mechanical and manual resources for rapidly building a ship of war. We see every country endeavouring to construct its ships rapidly and well, but with very different results. In each country methods differ widely, and well merit study and discussion. All countries may profit by the lessons they can gather from their neighbours.

Lessons of Chilian war.

While every day furnishes some new teaching, additions of serious importance to previous experience are seldom made, and much remains in the experimental stage. Thus, during the year 1891, but one Navy has been put to those crucial tests of active service from which so much may be learnt. The incidents of the war in Chili have alone thrown any light on the future. For my part I do not believe that the struggles of the civil war, worthy as they were of a better cause, have enlightened us on the points which occupy the minds of seamen. They have taught us, it is true, that in war daring is often rewarded by success. Certainly it was never more necessary than to-day. On the other hand, where, as in the case of the Blanco Encalada, no precautions were taken, a total loss was the natural consequence of the neglect of the most elementary principles of the art of war. Lastly, the employment of new weapons by crews full of courage but deficient in training give no indication of the value of the same weapons in more experienced hands.

Improvements in armour and guns.

With little of the experience which can alone be gained in active operations, we recognise great improvements both in guns and armour. Artillery attains initial velocities of over 2700 feet; quick-firing guns of moderate calibres have become practical weapons;

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torpedoes are being manufactured capable of carrying charges of 150 to 180 pounds of gun-cotton and attaining ever-increasing speeds. The metallurgist produces steel plates and plates of alloys which resist the best projectiles, and, but for the great increase of the initial velocity of projectiles, it might be said that armour had beaten the gun. By improved methods of welding, &c., compound armour has been so improved that it may again compete with plates of steel or nickel steel.

Ships now demanded by Navy.

Thus science pursues her onward course without a pause, constantly adding to the means available for defence or for destruction, and imposing the necessity for corresponding modifications in the type of ships of war. Each stage in the process of evolution becomes shorter and shorter as the nineteenth century approaches its end. The Navy now demands ironclads steaming 18 knots, of large coal-carrying capacity, with an armament well protected from the attack of those light guns, which, from the rapidity of their fire, have become such an important factor in naval warfare, and with an effective protection from shell-fire and the terrible powers of the torpedo. Sea-going cruisers are asked for capable of steaming 20 knots, and maintaining high speeds for long periods. In addition to the cruisers, vessels are required in great numbers, but of the smallest possible dimensions, to protect the large ironclads. On all ships, whether small or large, it is sought to give adequate protection to the gunners, the propelling machinery, and the vital parts. The problem of protection is difficult, and perhaps it is impossible to solve it. Everywhere the number and the size of torpedo-boats is increasing. Constructors have attained marvellous results with boats of 100 to 150 tons, capable of steaming up to 25 knots, and covering considerable distances at low speeds.

Admitted supremacy of British Navy.

Each country is labouring with an activity never seen before in a time of peace to increase its naval forces, and to provide them with every improvement. It is possible that a struggle will never take place. Those who have the destinies of nations in their hands cannot fail to appreciate the terrors of war under modern conditions. The following review of the Navies of the World, that of England excepted, will prove that I do not exaggerate. All admit that the British Navy is without a rival. While it is natural that England should be resolved on retaining a maritime supremacy, we shall find amongst other nations sufficient proof of maritime ambition. It is everywhere recognised how important is the Navy as a means of defending national interests. In reviewing the different navies I begin with France; I shall then proceed in the

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following order: Italy, Germany, Russia, Austria, Spain, Greece, and Turkey. Crossing the Atlantic I shall pass on to the United States, and the Republics of South and Central America. I shall conclude with China and Japan. As it is probable that in spite of every care some mistakes and some omissions may be detected, I wish, before going further, to beg those officers or constructors who discover them to be good enough to point them out. I shall be grateful.

France.

In France the condition of the Navy has never been so much discussed as in the last few years. There are those who maintain that she has a monopoly of mistakes, and that her ships alone are defective. It is generally known that there is no foundation for these pessimistic views. In every country the failures of ships of war when undergoing their trials are frequent. If the results are satisfactory, they are noted with peculiar emphasis.

Lightness of construction has produced bad results.

Every important Navy still suffers from the same evil: the lightness of construction of the hulls, boilers, and machinery has everywhere produced the same results, and led to the same reaction against a bad system, which has given us several unseaworthy ships, and which seemed solely invented to prove that naval constructors are not dismayed by problems however difficult. Though it has been decided to increase the tonnage of every type of fast cruiser, and to demand less exacting tests for the materials of which they are constructed, there are always before us problems very difficult of solution, especially in connection with boilers. In regard to these the French Navy has taken a step into the region of the unknown by adopting for most of the ships now under construction the multitubular type. In the absence of sufficient tests, it is a rash and imprudent step. It should be noted, on the other hand, that France has very seldom any failures with her ironclads or large cruisers. Her difficulties begin with cruisers of medium or small size.

Ships completed. Hoche, Marceau.

In 1891 the two first-class ironclads Hoche and Marceau were put into commission after trials which were not interrupted by any untoward incident. They both now form part of the Mediterranean Fleet, although the Marceau was for some months detached to share in the brilliant displays at Cronstadt and Portsmouth. The Hoche attained a speed of 16 knots, the Marceau 16·4, developing about the same horse-power. But these two ships, though they were designed at the same period (they have been almost ten years in course of construction), differ in their superstructures, their armament, and the

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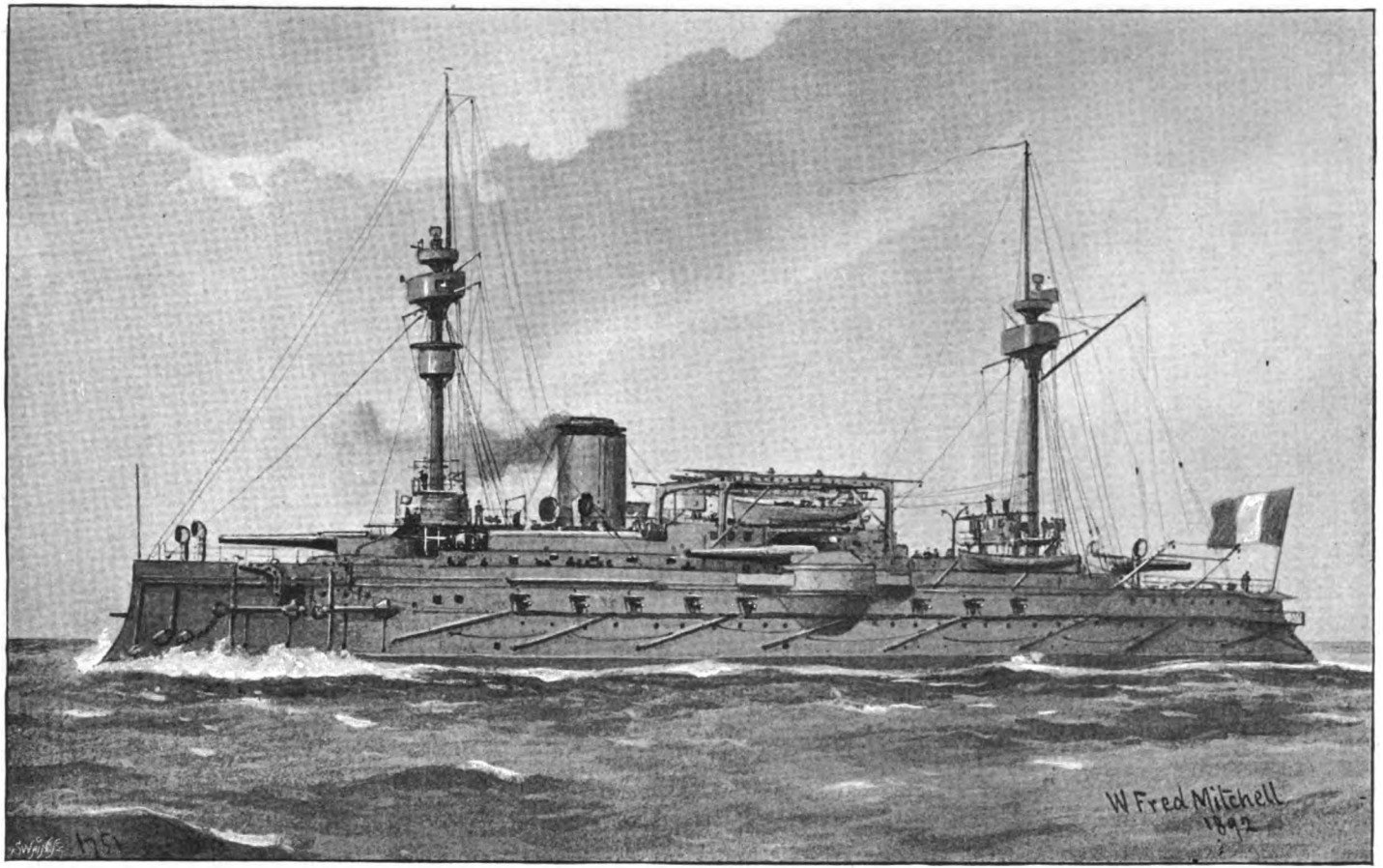

"MARCEAU."

FRENCH ARMOURED BATTLE-SHIP.

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arrangement of their decks. The Hoche, having turrets forward and aft, and a low bow like that of the Admiral type, is so elevated amidships that she resembles a floating castle. The Marceau, on the other hand, with her high bow has a more sea-going appearance. In the Hoche the main armament includes two 34-cm. (13½-in.) guns in enclosed turrets, one forward and one aft, and two 27-cm. (10¾-in.) guns on the broadside in barbettes. The Marceau has four 34-cm. (13½-in.) guns, mounted in barbettes, similarly situated. The very severe experiments made with the guns of the latter ship have shown that certain modifications must be introduced in the superstructure to enable it to resist the concussion of the big guns. It should be added that the damage done on board the Marceau by the shots fired right ahead or right astern was trifling.

Cruisers. Lalande, Cosmao, Coëtlogon.

The only cruisers which have been completed are the Lalande, Cosmao, and the Coëtlogon, the two first of 1880 tons, the third of 1850 tons, and all three of 6000 horse-power. The trials of the Lalande and the Cosmao were delayed by the necessity of enlarging the size of the ventilators. When this had been done the two cruisers passed rapidly through their trials, and were accepted after having attained a speed of more than 20·5 knots. The trials of the Coëtlogon have been remarkable for a succession of mishaps. After a final trial, which took place recently, the Government have refused to accept her, and the contractor is about to fit her with new machinery. She has steamed about 20 knots, but for fear of accidents forced draught was not employed. These three cruisers, whose radius of action is insufficient for them to undertake operations on their own account, are attached to the fleet as lookout ships.

Ships undergoing trials. Neptune, Jean Bart, Alger.

Four ships have commenced their trials: namely, the ironclad Neptune, sister-ship to the Marceau, the first-class cruisers Alger and Jean Bart. The two latter are practically of the same type, 4120 tons, 8000 horse-power, 20 knots speed. The fourth ship is the Davout, of 3027 tons. The Jean Bart, which was fitted out at Rochefort, went to Toulon to complete her trials. She made the voyage under excellent conditions of weather, and attained a speed of 18·5 knots. The Alger has not yet finished her trials. The Davout, which was built with great rapidity at the dockyard at Toulon, has had many failures since she has been fitted out. She is one of the most striking examples of the mistakes which have been made in the last few years. She was nearly two years undergoing her trials. At last, after many disappointments, she easily attained a speed of 19·2 knots without forced draught; which justifies the belief that she will be able to steam 20 knots. The Suchet, of

Davout.

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3027 tons, which is of the Davout type enlarged, seems still to be too small. The displacement is increased to 3725 tons in the Chasseloup-Laubat, Bugeaud, and Friant, which are now in course of construction.

Ships completing.

The ships completing include the first-class ironclad Brennus, launched on the 17th October, 1891. She is of 10,983 tons and 14,000 horse-power, and has an estimated speed of 17·5 knots. The Brennus is the only vessel in the French Navy which carries two guns mounted in the same turret on the English system. Her principal armament consists of three guns of 34-cm. (13½-in.), and ten 16-cm. (6¼-in.) guns. Two of the 34-cm. guns are in an enclosed revolving turret on the bow, the third also in a revolving turret is at the stern. Six of the 16-cm. guns are disposed in a central citadel protected by 4¾-in. armour, isolated from one another by strong steel-plated bulkheads in order to minimise the effects of shells bursting within the citadel. The other four 16-cm. guns are placed above the citadel, each in a small enclosed turret protected by 4¾-in. armour. The Brennus is also remarkable for the revival of the turret system of protecting the guns, which had already been employed on many coast-defence ironclads. This system of protection, as will have been noticed, has been adopted even with guns of moderate size; we shall find it again on all the new French ironclads.

Brennus.

Isly.

After the Brennus we must mention the first-class cruiser Isly, a sister-ship to the Jean Bart, which has been launched at Brest. The Wattignies, a torpedo cruiser of 1306 tons and 4000 horse-power, launched at Rochefort, is of an enlarged Condor type. Finally, the port of Lorient is completing two torpedo gunboats, the Léger and the Lévrier, 444 tons and 2400 horse-power. This type will probably not be reproduced. They will be replaced by vessels of a larger type, of which one, the D'Iberville, of 925 tons displacement, has just been laid down.

Ships laid down.

Battleships.

Three ironclads have been commenced, the Lazare Carnot, 11,986 tons, the Charles Martel, 11,882 tons, and the Jauréguiberry, 11,818 tons. Their principal armament includes two 30-cm. (12-in.) and two 27-cm. (10¾-in.) guns, all four mounted in turrets, the 30-cm. guns on the bow and on the stern, the 27-cm. (10¾-in.) guns on the broadside. These ships, which are to steam 18 knots with forced draught, will have their eight quick-firing 14-cm. (5½-in.) guns distributed on different systems. On the Jauréguiberry they will be mounted in pairs in four revolving turrets. On the two others they will be mounted singly in eight enclosed turrets. On the Jauréguiberry electric power will be used for moving the turrets and working

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the guns, while on the two other ships hydraulic power will still be retained. Protection for the hull is provided by a complete belt of armour 18 in. thick amidships, tapering to 11 in. thick at the ends, by a 2¾-in. armoured deck, and by a cofferdam covered with 4-in. armour. The turrets for the principal armament are protected with 14½-in. and those for the 14-cm. (5½-in.) guns with 4-in. plates.

Cruisers.

The second-class cruisers Bugeaud, Chasseloup-Laubat, and Friant have been commenced, as well as the Fleurus, sister-ship to the Wattignies (already mentioned), and the submarine-boat Zédé, which bears the name of the late eminent constructor of the Gymnote. The Zédé is an enlarged Gymnote, and, as in her case, the machinery will be driven by electric accumulators. The submarine-boat Goubet, which has been so much discussed, underwent some trials in the presence of a commission presided over by Admiral Gervais, but the results were not sufficiently satisfactory to admit of her being accepted for the French Navy.

Zédé.

Programme for 1892.

The programme of construction for 1892 includes the complete refit of the ironclad Friedland and the commencement of three first-class ironclads, one first-class cruiser, one third-class cruiser, two first-class cruisers for foreign stations, one torpedo depôt-ship, and six sea-going torpedo-boats.

Battleships.

The battleships will resemble those commenced in 1891. One will be of 11,000 tons, with triple screws, the others of 12,000 tons; all will be armed with two 30-cm. (12-in.) and two 27-cm. (10¾-in.) guns, eight 14-cm. (5½-in.) and 26 small quick-firers. They will steam about 18 knots, and will be able to cover 5000 miles at 10 knots.

Cruisers.
Charner.

The first-class cruiser is of a modified Charner type, of about 5000 tons. She will differ from the Charner in that her quick-firing guns will be mounted in positions specially designed for them. The armament will consist of two 19-cm. (7½-in.) guns, six 14-cm. (5½-in.) quick-firers, besides smaller guns, the number of which has not yet been fixed. With forced draught this cruiser should attain a speed of 20 knots. The third-class cruiser is of the modified Forbin type, after the designs of M. Lagane, the designer of the Pelayo. She will be of 2204 tons displacement, and will be armed with four 14-cm. (5½-in.) guns, two 10-cm. (4-in.) guns, and eight small pieces, all quick-firers. The original programme of the Minister of Marine included two 16-knot cruisers, sheathed with wood, for distant stations. These have been replaced by two fast cruisers of 3900 tons, the designs of which have not yet been finally approved.

The French Navy is also about to construct a torpedo-boat-

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carrying cruiser, as she is called in France, in imitation of the English Vulcan. She is to be named the Foudre, and will be built at Bordeaux. The principal dimensions are as follows: length between perpendiculars 370 ft.; beam at the water-line 51 ft.; draught of water amidships 20 ft. 3 in., aft 23 ft. 6 in.; displacement 5970 tons. She will be furnished with machinery of 11,400 horse-power, which will give an estimated speed of 19 knots. The protection consists of an armour deck 1½ in. thick amidships. She will carry 10 torpedo-boats, which will be handled by means of a sort of deck on rollers like that of the Marceau. The armament includes eight 10-cm. (4-in.), four 65-mm. (2½-in.), and four 47-mm. (2-in.) quick-firing guns. She will have five torpedo launching-tubes. The designs of the Foudre are by M. Duplaa Lahitte, constructor of the Navy. She is to be completed in 1897.

Foudre.

D'Iberville.

One torpedo gunboat, of 925 tons, of a new type, has just been commenced at the yards on the Loire. She is to be named the D'Iberville, and is designed by M. de Bussy. The principal dimensions are as follows: length between perpendiculars 262 ft.; maximum beam 27 ft.; draught of water aft 11 ft. She is to be fitted with machinery of 5000 horse-power, and the estimated speed is 21·5 knots. The machinery, boilers, &c., are protected by a steel deck ⅝ in. in thickness; and the sides are formed of three plates of hardened steel. The armament includes one 10-cm. (4-in.) quick-firing gun on the bow, one 65-mm. (2½-in.) quick-firing gun mounted aft, and as many 37-mm. (1½-in.) quick-firers as possible. She will have four torpedo launching-tubes. During the course of the year an almost similar vessel will be commenced, to be named the Cassini. Four sea-going torpedo-boats and ten first-class torpedo-boats complete the list.

Date of completion of ships building.

To sum up, the French dockyards will have, without counting fourteen torpedo-boats, twenty-nine ships building, viz., eleven ironclads, six armoured cruisers, nine protected cruisers, two torpedo gunboats, and one torpedo-boat-carrying cruiser. It is estimated that during the year the ironclad Magenta, the two armoured gunboats Phlégéton and Styx, of an old and very inferior type, the armoured cruiser Dupuy de Lôme, which is about to commence her trials, the submarine-boat Gustave Zédé, twelve sea-going torpedo-boats, and twenty-four first-class torpedo-boats will be completed. An official memorandum estimates that in 1893 will be completed one battleship, one coast-defence ironclad, three armoured cruisers, three cruisers, one torpedo gunboat, and seven first-class torpedo-boats; in 1894 three coast-defence ironclads, one armoured cruiser,

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and one second-class cruiser; in 1895 three ironclads, five cruisers, and one torpedo depôt-ship; in 1896 two ironclads and one cruiser.

Ordnance and armour.

In gunnery the progress has been great. Sixteen, 19, and 24-cm. guns of the 1889 model have been tried with success, and have shown an initial velocity of 900 yards with smokeless powder. In the construction of quick-firing guns France has allowed herself to be outpaced, but their manufacture has now been taken in hand. The Government workshops at Ruelle have successfully transformed 4, 5½, and 6¼-in. guns of the 1887 model, and have seriously undertaken the manufacture of artillery which is to give 2775 feet initial velocity. Lastly, after some successful experiments at the Hoc range, Canet, the eminent manufacturer, has received an order for 10-cm. (4-in.) guns. Creusot nickel-steel plates 10 in. in thickness were tested at Gavres, and received the approbation of the Commission. The manufactory of Saint Chamond has made some highly successful experiments with thin plates.

Manœuvres.

As in preceding years, manœuvres on a large scale took place in the Mediterranean between the coasts of Spain and Corsica. The weather was more or less unsettled, and the manœuvres taught once again the lesson that, when there is any sea, torpedo-boats and small cruisers find considerable difficulty in keeping company with the ironclads and large cruisers. For the first time that portion of the Reserve who are on the ordinary roll and who are not sailors by profession were embarked. Although the weather was not really bad, those who were embarked on the smaller ships were prevented by sea-sickness from performing their duties, which proves that these mariners for the time being ought not to be incorporated with the professional sailors of the *Inscription Maritime*.

Increase of ships in commission.

I will finish this review of the French Navy by saying that under the influence of public opinion, and in consequence of a vigorous discussion in the Press, the Government has determined to provide the fighting-ships, some with complete crews, the remainder with reduced complements, but yet sufficiently numerous to ensure that the mobilisation of the fleet will be carried out for the future with a certainty and rapidity that has never been known before. Thus there will be this year in the Mediterranean an effective fleet of twenty-three ships, including nine ironclads; in the Channel a fleet of twelve ships, including six ironclads; in the Atlantic a light squadron of four cruisers which replaces the old North Atlantic squadron; besides nineteen ships in reserve, including nine ironclads. This is the exaggerated application of a system which, though excellent in principle, ought not to be strained in time of peace by

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keeping in commission old ships which must before long be removed from the *Navy List*.

Increase in naval expenditure.

The Minister of Marine calculates on meeting the extra cost of putting these ships in commission from the ordinary votes of 1892, on the condition that it will not be necessary to provide the funds before the spring. In 1893 the Minister will be compelled to ask for an increase in the funds placed at his disposal by the Budget. This is a point which seems to have been purposely forgotten during the long and serious discussion on the Navy Estimates—a discussion which occupied no less than eight sittings, and in which conflicting opinions were put forward with complete freedom. All the speakers agreed that it was necessary to provide in the coming years for an increase in naval expenditure, especially under the head of shipbuilding and ordnance stores. Thus the French Navy, which already devotes £2,800,000 to the building and completion of ships, will be compelled very shortly to spend £4,000,000 on the same object.

Future shipbuilding policy.

It should be noted that during this interesting debate no allusion was made to the strength of the English fleet, nor was any comparison attempted—the only care of French politicians being to put their fleet in a condition to meet the forces of the Triple Alliance. An official memorandum has informed the country that, merely to replace the ships which become obsolete in the next few years, it will be necessary to build—

9 first-class ironclads,
4 coast defence ironclads,
6 ironclads for foreign stations,
34 cruisers of different types,
19 look-out ships,
9 gunboats for foreign stations,
Total 81 ships.

Though it is not proposed to replace the above vessels, ship for ship, the foregoing list gives an outline of the future shipbuilding policy. Every year the shipbuilding programme to be submitted to the approval of Parliament will be decided by the council under the Presidency of the Minister of Marine in the same way as that for 1892.

Torpedo-boat flotilla.

In consequence of the extended coast-line she has to defend, France proposes to proceed with the construction of torpedo-boats at a rate which will give her in 1895 a flotilla of 34 sea-going torpedo-boats and 228 torpedo-boats of the first, second, and third class. One of the new first-class torpedo-boats, 118 ft. long and

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of 80 tons displacement, constructed by Augustin Normand, of Havre, has attained a speed of 23·6 knots. The sea-going torpedo-boats now on the stocks will have, when fully loaded, a speed of at least 25 knots.

Such is in outline the present condition of the French Navy. Every effort is being concentrated on the reorganisation of the forces at home and on the defence of the seaboard, including that of Corsica, Algeria, and Tunis, where powerful flotillas of torpedo-boats are about to be established.

GERMANY.

The *North German Gazette* published at the end of last year a pressing appeal to the German public to direct their attention to the needs of the Navy. Last year the Reichstag reduced several of the shipbuilding votes, and it might very well criticise still the delay in carrying out the programme of 1888–89. It is not sufficient to draw up a complete shipbuilding programme; it is necessary to have the means to carry it out within the intended time and without exceeding the estimated cost—two conditions difficult to realise in a country which has not a large experience in shipbuilding, and which have not been realised in Germany. But if in these respects there has been some disappointment, real progress has been made, and we can foresee a time when Germany will become a naval power of importance. The constant increase in the number of the *personnel* furnishes efficient crews, and, on the other hand, the gradual additions to the staff of officers helps to open the higher posts to men who, though young, are well trained, ambitious, and full of energy. Germany is proceeding to organise her Navy in the same scientific way in which she has organised her Army.

Manœuvres.

As in former years the German Navy had considerable practice during the summer in tactical evolutions, and manœuvres on a large scale took place at the entrance of the Bay of Kiel, which, according to the *Times*, were remarkable for some extraordinarily improbable assumptions. In every country the plan of the manœuvres has always the misfortune to be carried out without taking into consideration the incidents which would arise in time of war. The skill of the staff who prepare the programme consists in making the conditions resemble those of actual warfare as nearly as possible; but, whatever they do, they are obliged to leave on one side considerations which, in reality, would often modify the decisions of the umpire. The Germans up till now have appeared to trouble themselves very little in order to give this minimum of satisfaction

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to the rules of actual warfare, but they, perhaps, are not very far wrong, for naval manœuvres can only be considered as exercises on a large scale, and on many minds they have an exaggerated influence. The German manœuvres, at any rate, showed that the mobilised vessels manœuvred with admirable precision.

Ships completing. Battleships. Three ironclads of 10,000 tons and 16 knots are completing afloat, namely, the Kurfurst Friedrich Wilhelm, the Brandenburg, and the Wissenburg; the former was launched in 1891. There remains on the stocks one ironclad of the same displacement. Two coast-defence ironclads, the Beowulf and the Frithof, the latter launched the 21st September, 1891, are completing afloat. Their prototype, the Siegfried, only steamed 16 knots on her trials instead of the 18 knots estimated. The third-class cruiser Falke has been launched.

Torpedo-boats. Two torpedo-boats of 350 tons and 26 knots have also completed their trials. Two others should be ready shortly. Germany calculated on increasing her torpedo-boat flotilla in 1891 by 50 torpedo-boats, 22 of which are to displace 90 to 145 tons, and to steam 24 to 26 knots, while 18 are of 75 tons and 25 knots, and 13 of 35 tons and 18 knots.

Delay in carrying out programme. Ironclads. The German yards have not been able to undertake all the ships in the programme; amongst the ironclads one, which is known by the letter C, of 10,000 tons, has not yet been launched. Of the coast-defence ironclads, of the modified Siegfried type, four—R, S, T, U, laid down in 1890—will be completed in 1894, 1895, and 1896. The three others, V, W, and Z, have hardly been commenced for want of funds.

Cruisers. The protected corvettes of the modified Irene type, of 5500 tons and 20 knots, H, J, K, L, M, N, O, P, are still more backward. H, now named the Kaiserin Augusta, alone has been launched. The sums voted in 1890 for J and K not having been spent, the sums which it was wished to devote to them in 1891 were refused by the committee of the Reichstag.*

Gunboats. Passing to the gunboats of 1460 tons and 16 knots of the modified Sperber type, E, which is on the stocks, will be launched and completed in 1892, as well as the Ersatz-Eber and Ersatz-Adler. The gunboat F of the same type has not yet been commenced.

The torpedo gun-vessel G, of 1080 tons and 24 knots, will be finished in 1892. A similar ship which it was intended to build has been abandoned. The cruiser-yacht of 3350 tons and 20 knots has not been proceeded with. The dynamite cruiser of 1030 tons and 22 knots will be launched and completed in 1892.

* See Geranm Navy Estimates in Part IV. Several votes have this year been refused by Reichstag.—Ed.

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According to trustworthy information, the German Admiralty have been obliged to modify the plans of several of the ships included in the programme. There is no cause for astonishment at this, for the same thing has happened more than once in older navies in spite of their experience. But if the main fleet of the German Empire has not fulfilled the expectations of German statesmen, it is not the same with torpedo-boats. Germany possesses at the present moment seventy-eight sea-going torpedo-boats and seven torpedo-division-boats of excellent types. Moreover, her system of coast defence is so well organised that it may serve as a model to all the navies of the world.

Italy.

The financial situation which is so acute in Italy has compelled her to reduce her expenditure on the Navy, and the activity of her dock-yards seems to have suffered in consequence. The Navy Estimates for 1892–93 amount to £4,089,368, of which £1,080,000 are available for new construction, a decrease of £168,000 on those of the current year.

Battle-ships.

The ironclads completing include Re Umberto, Sardegna, and Sicilia, of 13,251 tons, none of which will be ready for sea during the current year. Little work is being done on the Sicilia at Venice, and she will not be completed till 1894, viz., ten years after being laid down. It should be remembered that one of the characteristics of these ironclads is the position of the turrets in the centre of the ship with two guns in each turret; another is a triple hull capable of resisting 154 lbs. of gun-cotton. The Italian Admiralty have abandoned the monster guns of 100 tons and over for those of 67 tons.

Cruisers and torpedo gun-boats.

The cruisers Lombardia (which is undergoing her trials), Liguria, Etruria, Umbria, of 2280 tons, and the Elba, of 2730 tons, will be ready for sea in 1892. The Marco Polo, of 4580 tons, will not be completed till 1893. The torpedo gunboat Tersicore, of 846 tons, will shortly commence her trials. The Urania, Euridice, Aretusa, and Iride, of a similar type to the Tersicore, have been launched. The Urania and Iride have attained a speed of 19·6 knots on their trials. All the cruisers are to be completed in 1892, with the exception of the cruiser Calabria, sister-ship to the Etruria, the gun-vessel Governalo, and the small transport Ercole. Ten torpedo-boats are to be delivered this spring.

Programme for 1892–93.

The shipbuilding programme for 1892–93 comprises—

1 first-class ironclad,
2 second-class ironclads,
6 torpedo gunboats,
10 sea-going torpedo-boats.

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The first-class ironclad, of the same type as the Re Umberto, has already been commenced at Castellamare, as well as two of the torpedo gunboats, one of which is to be called the Clio. The designs of the second-class ironclads have not yet been decided on. The Italians are endeavouring to reduce the tonnage as much as possible; but as they require good speed, adequate protection, and a powerful armament, the displacement of these vessels will probably be between 11,000 and 12,000 tons. The new torpedo gunboats will be of the 846-ton type. Besides the above, some torpedo-boats and transports will be laid down.

Ships in commission. For the 1891 manœuvres Italy did not mobilise any ships not already in commission. She has, however, organised two squadrons. The permanent squadron includes five ironclads, four protected cruisers, and six torpedo cruisers. It will be kept in commission for six months, and in reserve for the remainder of the year. The reserve squadron consists of six ironclads, including the five modern ironclads Duilio, Dandolo, Lepanto, Andrea Doria, and Ruggiero di Lauria, five protected cruisers, and six torpedo cruisers. The training squadron has been laid up.

Personnel. The effective *personnel* of the Navy consists of 20,660 men, 14,610 of whom are afloat.

Torpedo-boats. Italy has sixty-four sea-going torpedo-boats afloat. Moreover, twelve torpedo-boats of 85 tons and 21 knots were to be delivered from Schichau in 1891, and twelve others of the same type in 1892. The principal stations for torpedo-boats are Spezzia, Gaeta, Messina, Torento, Ancona, and Venice. Maddalena, where the Italians are establishing an important post of observation, is also a torpedo-boat station.

Russia.

Increased activity in ship-building. Like France and the United States, Russia faces two oceans, and, as the distances which must be covered to unite her two fleets are very great, she endeavours to establish in both powerful maritime influence. This, and the fact that the Baltic Fleet is frozen in for the greater part of the winter at Cronstadt, involve a heavy expenditure. But both in the north and in the south, considerable energy is being shown in naval matters, and the activity of the dockyards is about to be increased under the impetus given by the Czar to naval affairs. The dockyard of St. Petersburg is now being provided with new plant, which will enable it to build six large vessels and two of moderate tonnage at the same time.

In 1891 the ironclad Navarin was launched at St. Petersburg;

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she is a ship of 9476 tons and 9000 horse-power, designed to steam 16 knots. In Sweden two small mining-boats, the Bug and the Doney, have been launched which should steam 13 knots. The ironclad Dvenadsat Apostoloff, of 8076 tons and 15 knots, built at Nicolaieff, is now waiting the opening of the navigation to go round to Sebastopol to be fitted with her armament. The Gangoot, of 6592 tons and 15 knots, is nearly completed. Ships completing.

The following ships have been completed:—Nicholas the First, ironclad, of 8440 tons and 15 knots; the Imperial yacht, Porlarjnaia Sviezda (Polar Star), of 3640 tons and 6000 horse-power, which has steamed 18·85 knots; and the yacht of the Grand Duke Alexis, the Strela, built at St. Nazaire, which has steamed 17·9 knots. The Porlarjnaia Sviezda can be armed in time of war and do good service as a cruiser. Ships completed.

The ships in course of construction include the cruiser Rurick, of 10,923 tons, building at St. Petersburg. She will have a belt of compound armour 10 in. thick, and extending over two-thirds of her length. She will carry in her battery sixteen 6-in. (15-cm.) guns, and on her upper deck four 8-in. (20-cm.) guns, two forward and two aft, besides six guns of 4·8-in., and will be fitted with four torpedo-tubes. The Rurick will have machinery of 13,250 horse-power, and will carry 2200 tons of coal, which will enable her to steam from Cronstadt to Vladivostock without stopping at 10 knots. Her estimated speed is 18·5 knots with natural draught. Ships under construction. Rurick.

The dockyard at St. Petersburg was to have launched, in the autumn of 1891, the two armoured gunboats of 1492 tons, Otjavny and Gremiastchy, but they will not be launched till the spring of this year. They have an armoured belt of steel, 3 to 5 in. in thickness, and their principal armament consists of two guns, one of 9-in. on the bow, and one of 6-in. on the stern, which are protected by shields. Otjavny and Gremiastchy.

The same dockyard is building the ironclad Lizoi Veliky, of 8880 tons; length, 345 ft.; beam, 68 ft. She is to have engines of 8500 horse-power, and to steam 16·5 knots. She will have two barbettes, each to carry two 12-in. guns, while her battery will be armed with six 6-in. (15-cm.) guns. She will also carry twelve 47-mm. and four 37-mm. quick-firers. She is protected with Wilson's compound armour, 16 in. thick on the belt, and 14 in. thick on the barbettes. Lizoi Veliky.

Of the ships under construction the battleships Gangoot and Navarin, and the armoured gunboats Otjavny and Gremiastchy, of the Baltic Fleet, and the ironclad Dvenadsat Apostoloff, of the Black Sea Fleet, are to be completed in 1892, the armoured cruiser Rurick in 1893. Dates of completion.

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Gheorghy Pobyedonosets.

In the Black Sea, the battleship Gheorghy Pobyedonosets (George the Victorious) is to be launched at Sebastopol very shortly. She is of 10,280 tons and 15,000 horse-power, of the Sinope type slightly modified. She is to be completed in 1893. At Nicolaieff a battleship of 12,480 tons, which bears the name Tri Sviatiteli (The Three Saints), is in course of construction. She is to be completed in 1894

Tri Sviatiteli.

New programme.

The new programme of the Russian Navy includes three battleships of 10,960 tons, the Sevastopol, Poltava, and Petropavlosk, of the Navarin type enlarged; one armoured cruiser of the Rurick type; two coast-defence ironclads of 4000 tons; three torpedo cruisers, the Voevada, Pocadnick, and Griden; two look-out ships, and ten first-class torpedo-boats. All these ships are to be completed by 1896. All those for the Baltic Fleet will be built in Russia, with the exception of the Voevada and the Pocadnick, which will be constructed at Elbing by Schichau, the look-out ships, which will also be ordered abroad, and one torpedo-boat, for which Normand of Havre will receive the order. The Griden will be built at Nicolaieff. A new ship, un-named, having a displacement of 12,000 tons, was commenced last autumn, and the engines were ordered from Messrs. Humphry, Tennant & Co.

France, as is well known, refuses Russia nothing. She has lent her an expert for the manufacture of smokeless powder, and a number of the repeating rifles of the Russian army are made in the workshops of the centre of France. For her Navy, Russia asks for comparatively little help. She has, however, ordered the armour of the Gheorghy Pobyedonosets from Creuzot, and bought from Canet the designs of his 4·8-in. and 6-in. quick-firing guns. Russia always obtains from English yards the large steamers which compose the auxiliary fleet, and which make the voyage to Siberia. The engines for many of her ships are also ordered from English makers.

Austro-Hungary.

The condition of the Navy occupied considerable attention at the meeting of the Diet, and Admiral de Sterneck, the head of the Navy, declared that it was absolutely necessary to elaborate a programme for the increase of the Imperial Navy, because most of the ships of which it is at present composed do not fulfil the conditions necessary for naval warfare.

Ships building.

The Austrian dockyards are almost empty, for the only ships of any importance to be found in them are the protected cruiser Maria Theresa, of 5200 tons and 19 knots, which should be completed at the

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end of 1893, and the cruiser Donau, of 3000 tons. The torpedo catcher Satellit, of 500 tons and 20·5 knots, was laid down in 1891, and a vedette torpedo-boat of 22·5-knot speed has been ordered from Schichau. Ships completing.

The Trabant, torpedo gunboat, of 480 tons and 21 knots, has been launched. Besides this vessel, the ships completing include the cruiser Kaiserin Elizabeth, of 4060 tons and 19 knots, which will shortly commence her trials; the torpedo gunboat Planet, of 480 tons, which was at first refused on account of her defective boilers, but has now been accepted; and the torpedo depôt-ship Pelican, of 2430 tons and 17 knots, which will be completed in the course of the present year. Two monitors, for service on the Danube, which are to displace 448 tons and have machinery of 1250 horse-power, are in course of construction: one of them is called the Theiss.

Denmark.

The Danish Navy has laid down the third-class cruiser Heindal, of 1280 tons, sister-ship to the Geiser. This type is protected by an armoured deck, and is to steam 17·5 knots. The armament has been modified, and will consist of two 4·8-in. quick-firing guns, four 2¼-in. quick-firing guns, and four torpedo launching-tubes. She will have Thorneycroft boilers. The Geiser is being pushed forward. The third-class cruiser Hekla, the first ship of the Geiser type, steamed 17 knots at her trials. The torpedo transport Hjalperen, of 268 tons, has been also completed, as well as the torpedo-boat Springgerer, of 84 tons, which was launched in 1891, and which attained a speed of 18·3 knots on her trials.

A small ironclad of 3290 tons is in course of construction, and a coast-defence ironclad of 4500 tons (a size between that of the Iver Hvitfeldt and Heligoland), of which the design is not definitely fixed, is projected.

Greece.

The three ironclads Hydra, Spetsia, and Psara, built in France, have been handed over to the Grecian Navy and have reached the Piræus. The Tricoupis Cabinet had proposed to build several fast cruisers of small tonnage, but their successors have not carried out this intention, the finances of the kingdom demanding a policy of economy. In spite of this, the progress of the Grecian Navy in the last few years has not been made without alarming Turkey.

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HOLLAND.

Holland possesses two Navies. The cost of the Home Navy is provided from the home estimates; that of the Indian Navy is provided for in the Budget of the Dutch Indies. The first, composed of small ironclads, cruisers, gunboats and torpedo-boats, is intended to defend home waters; the duties of the second are confined to the services of the Colonies in the Indian Ocean.

Koningen Wilhelmina. The principal dockyard of Holland is at Amsterdam, where the turret-ram Koningen Wilhelmina der Nederlanden, of 4600 tons, laid down April 22nd, 1891, is in course of construction. Her principal armament will consist of two 11-in. and two 6·8-in. Krupp guns. One of the 11-in. guns is mounted in an enclosed turret as a bow chaser, the other is mounted in a barbette for stern fire. The 6·8-in. guns are in sponsons on the sides. The estimated speed is 17 knots.

Reinier Claesen. Last November a small ram, the Reinier Claesen, of 2490 tons, was launched. Her principal armament will include an 8·4-in. gun on the bow, another of 6·8 in. on the stern. The cruiser Sumatra, of 1700 tons, has attained a speed of 17 knots, and, after completing her trials, sailed for Batavia.

Torpedo-boats. The Dutch Navy has six torpedo-boats of 80 tons, in course of construction, which will make a total of 25 in her torpedo-boat flotilla. They are excellent little boats, the design of which has been suggested by that of Yarrow's boats.

East Indian Navy. The East Indian Navy will shortly be increased by two fourth-class cruisers of 1090 tons, constructed in private yards; one, the Lombok, at Amsterdam, the other, the Sumbawa, at Flessing.

The estimates for the Home Navy amount to £1,240,000. It is said to be the intention of the Government to demand a considerable sum for increasing the fleet and for laying down ships which would represent the most recent progress in the art of shipbuilding.

The Dutch Navy, during the summer of 1891, carried out some manœuvres at the entrance of the Meuse, in which a squadron of the Navy and a division of the Army took part.

NORWAY.

Heimdal. The look-out ship Heimdal has been laid down. Her principal dimensions are as follows: length at the water-line, 167 ft. 4 in.; beam at water-line, 26 ft. 10 in.; mean draught of water, 13 ft.; displacement, 630 tons. She is fitted with machinery of 700 horse-

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power, and the estimated speed is 12 knots. Her armament consists of four 69-mm. Hotchkiss guns.

The first-class gunboat Viking was launched in 1891. Her principal dimensions are: length at water-line, 203 ft. 6 in.; beam, 30 ft. 6 in.; mean draught, 12 ft.; displacement 1123 tons. She is fitted with machinery of 2000 horse-power. The armament includes two 6-in. Krupp guns, four 69-mm. and four 37-mm. Hotchkiss Q.F. guns, and two 79-mm. guns for service ashore. She has three torpedo launching-tubes. The Viking is protected by an armoured turtle-back deck extending from stem to stern, and by a belt of cellulose at the water-line. Viking.

The Norwegian Navy Estimates for 1892 amount to 2,619,000 crowns, or £145,000.

Portugal.

For some years past, Portugal has intended to increase her Navy; she has put out for tender amongst English and French contractors different types of vessels; but the financial crisis which is raging in the country does not permit, at present, of these plans being carried out.

The gunboat Don Louis I., of 600 tons, has been launched. No other ship in Portugal has been launched in 1891. The fifty vessels of which the Portuguese Navy consist are, almost without exception, ships out of date and valueless for fighting purposes, or gunboats destined for service in the Colonies.

Morocco.

The Sultan, who only possessed one steamer of 1800 tons, the Hassani, has just ordered from Orlandos' yard at Leghorn a cruiser to carry four guns, which will cost £100,000.

Spain.

The Spanish Navy Estimates have risen to £1,523,544, but a special fund of £9,000,000, spread over ten years, is at the disposal of the Admiralty for reinforcing the fleet. Spain devotes her attention, above all, to cruisers, in order to ensure the safety of her communications with her rich Colonies. The naval policy of Spain seems, therefore, to be designed rather for protection than for offensive purposes.

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Ships building.

In 1891 the protected cruiser Cardinal Cisneros, of 7000 tons, 13,000 horse-power, and 20 knots, sister-ship to the Viscaya and Oquendo, launched last year, has been laid down. The Alfonso XIII., of 4800 tons and 7800 horse-power, has been launched. Preparations have been made for laying down the large armoured cruiser Emperor Charles V., of 9235 tons, 15,000 horse-power, and 21 knots. The Lepanto, of 5000 tons, 11,000 horse-power, and 20 knots, will be launched in 1892; the Cataluna and the Princessa de Asturias, of the Oquendo type, in 1893. The cruiser Maria Theresa, of 7000 tons and 20 knots, is completing, as well as the Ensenada, of 1050 tons and 15 knots. The latter should be ready in 1892.

Ships completed.

The protected cruisers Alfonso XII. and Reina Mercedes, of 3200 tons and 4800 horse-power, have been completed. The Alfonso XII. fell far short of a speed of 17 knots, for which she was designed. The small cruiser of 1150 tons, the Venadito, has been completed in 1891, and steams 14·5 knots. Amongst the smaller ships must be mentioned the torpedo gun-vessels of 550 tons and 18 knots—the Andaz, completed in 1891, the Galicia and Marquis de Molins, launched last year, the Nueva España, the Tenerario (formerly called the Veloz), and the Rapido completing afloat.

Torpedo-catchers.

The type of torpedo gun-vessel seems to be abandoned for four torpedo-catchers, which will closely resemble the Sharpshooter, and will be of 750 tons displacement. They have just been ordered from private contractors. These vessels are designed to steam 20 knots, and are provisionally designated by the letters A, B, C, D. No torpedo-boat has been ordered lately, but some activity has been shown with regard to the defences of the coast.

Spain has had experiments made in France, in transforming weapons of old type into quick-firing guns. The workshops at Creusot which have undertaken these experiments have obtained, with a 5·6-in. gun firing a projectile of 88 lbs., an initial velocity of 2100 ft.

According to the plan of Admiral Berenger, three naval divisions will be organised, with headquarters at Cadiz, at Ferrol, and at Carthagena. To these divisions, which are to be composed of ironclads and fast cruisers, will be added auxiliary squadrons, whose special duty will be the defence of the coast. The cruisers Reina Christina and Reina Mercedes will be able to serve as transports, the cruiser Alfonso XII. as a floating workshop.

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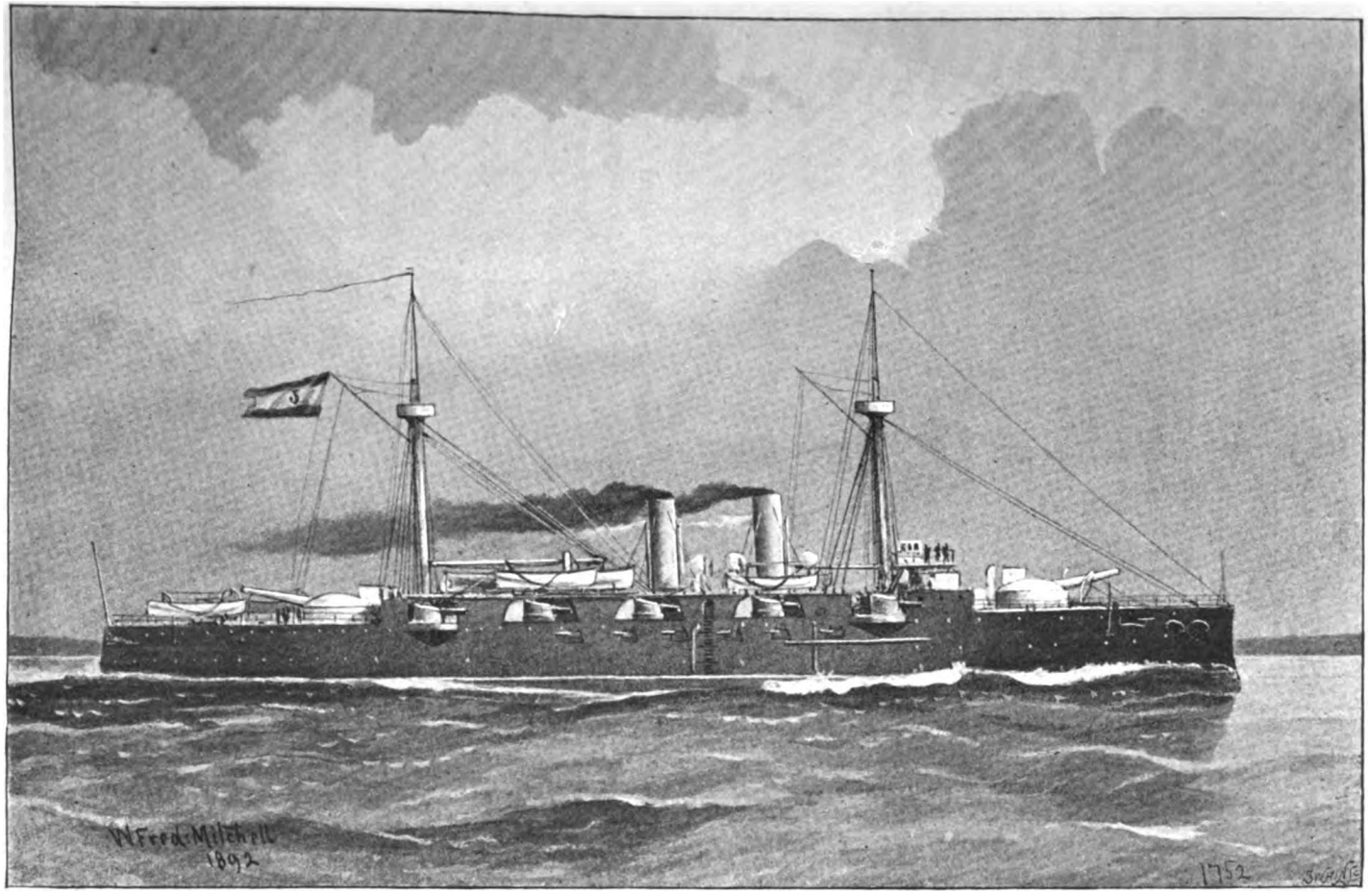

"INFANTA MARIA TERESA."

SPANISH ARMOURED CRUISER.

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SWEDEN.

The Swedish Navy has laid down the ironclad Thule, of 3135 tons. She is of a similar type to the Gota, with the addition of a ram. The Gota was commissioned in 1891. With a draught of water of 16 ft., and with natural draught, the engines developed 3160 horse-power, and a speed of 14·90 knots was attained; with forced draught the engines developed 4677 horse-power, and the speed attained was 15·96 knots. The second-class gunboat, Svenskund, and two second-class torpedo-boats, the Agda and Agne, were launched in 1891, and are now ready for sea. The Svenskund is of 267 tons displacement, and is fitted with machinery of 452 horse-power, with which she has attained a speed of 12·46 knots. Her armament consists of four quick-firing guns. The second-class torpedo-boat Bylgia, which attained a speed of 18·2 knots at her trials, is also ready for sea.

In 1892 two first-class torpedo-boats, 121 ft. long, to be named the Gondul and Guden, will be laid down. They will be fitted with two 15-in. torpedo launching-tubes, and will be armed with two light machine-guns.

The Swedish Navy Estimates for 1892 amount to £465,000.

TURKEY.

The Turkish Navy continues to decline. Those who are at the head of it are well aware of the lamentable condition of their fleet, but are prevented from putting any plans which they may form into execution by the exhaustion of the treasury. They had wished to build a large ironclad and several fast cruisers; but were compelled to abandon the idea for want of money. Latterly they have been less ambitious; they have only talked of ordering gunboats.

The arsenal at Constantinople has been slowly but steadily working at the cruiser Heybetnuma, of 1960 tons and 2500 horse-power, launched in 1890. The other ships in hand are the cruisers Loufti-Humayoun, of 1160 tons and 1800 horse-power, and the Fezibari, of 1815 tons and 2500 horse-power. It is not known when these ships will be ready. The engines of the Heybetnuma are not yet finished; she is being built in the Government yards with the help of a contractor. On the 9th of last November, the first keel plate of a transport, which has been named the Shadié, was placed in position.

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United States.

Ships under construction.

The Navy of the United States has continued to progress through 1891. The yards are a scene of activity, and are remarkable for a rapidity in the rate of construction which is only equalled in England. The list of ships which are in hand, whether on the stocks or afloat, is instructive. Let us take first the ironclads.

Texas.

Texas, battleship of 6300 tons and 8600 horse-power, completing at Norfolk. This vessel will steam 17 knots, and will be armed with two 12-in. and six 6-in. guns. She will be protected by 12-in. armour, both on the side and on the turrets.

Maine.

Maine, armoured cruiser, 6648 tons, 9000 horse-power, launched 18th November, 1890, at New York. Speed, 17 knots. Principal armament, four 10-in., six 6-in. guns. Same protection as the preceding.

Monterey.

Monterey, coast-defence turret-ship, 4138 tons and 5400 horse-power. Launched at San Francisco, April 28th, 1891. Speed, 16 knots. Principal armament, two 12-in. and two 10-in. guns. 13-in. armour on the water-line and 14-in. armour on the turrets.

Indiana, Massachusetts, Oregon.

Indiana, Massachusetts, Oregon, battleships of 10,231 tons and 9000 horse-power, laid down in 1891. They are to be finished in three years. Speed, 15 knots. Principal armament, four 13-in., eight 8-in., and four 6-in. guns. The 13-in. and 8-in. guns are in pairs, mounted in barbettes. Protection consists of 18-in. armour on the water-line, 17 and 6-in. armour on the turrets. The hull, abreast of the turrets, is protected by 5-in. steel plates. They will probably be completed in 1894.

New York.

New York, armoured cruiser of 8150 tons and 16,500 horse-power, on the stocks at Philadelphia. Speed, 20 knots. Armament, six 8-in. guns, twelve 4-in. quick-firing guns. 5-in. armour on a portion of the side and 10-in. armour in the turrets. To be completed in 1893.

A sea-going monitor of 3130 tons, which appeared in the ship-building programme, is no longer on the list of the American Navy.

Coast-defence ram.

On the other hand, a coast-defence ram, designed by Rear-Admiral Ammen, was laid down in 1891. Displacement, 2050 tons; 4800 horse-power; protection, 18 in. of steel armour on the conning tower, and 6 in. of steel on the sides. This vessel is to steam 18 knots, and will be completed in 1892. Although primarily intended only to fight with the ram, it has been considered necessary to provide her with a light armament. In battle the hull will be submerged, only the conning tower being out of water.

Miantonomoh.

Miantonomoh, an antiquated monitor, has completed her trials

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after a refit, in the course of which she was provided with new machinery, and with a modern armament composed of four 10-in. guns mounted in pairs in her two turrets.

Eight cruisers are in course of construction, namely :—

Cruisers.

Cruiser No. 6, of 5500 tons and 13,500 horse-power, building at San Francisco since 1890. Speed, 20 knots. Armament, four 8-in. and ten 5-in. guns. The 8-in. guns are mounted forward and aft in two barbettes, protected with 4-in. steel. This vessel will be completed in the summer of 1893.

Raleigh and Cincinnati, of 3183 tons and 10,000 horse-power. The first has been constructed at the dockyard at Norfolk. The second at New York. Speed, 19 knots. Armament, one 6-in. and ten 4-in. guns. Both will be ready early in 1893.

The Montgomery, Detroit, and Cruiser No. 11, of 2000 tons and 5400 horse-power. The two first were launched at the end of 1891 at Baltimore, the third is on the stocks at Boston. Speed, 17 knots. Armament, two 6-in. and eight 4-in. guns.

Cruiser No. 12, of 7350 tons and 21,000 horse-power, ordered the 19th November, 1890, from Cramp, of Philadelphia. The Secretary of the Navy reports that three-tenths of the hull were completed on 1st October, 1891. Speed, 22 knots. Armament, one 8-in., two 6-in., and twelve 4-in. quick-firing guns. This ship will have three screws driven by three vertical engines; the sides will be formed of steel plates 2 to 4 in. thick.

Cruiser No. 13, sister-ship to the preceding, ordered from Cramp, August 31st, 1891, to be delivered in twenty-four months. The whole of the armament of these cruisers, less than six inches in calibre, consists of quick-firing guns.

Trials of cruisers.

The cruisers which have completed their trials are three in number, the Concord, Bennington, and Newark. The two former are of 1700 tons and 3400 horse-power. The Concord has steamed 16·8 knots, and the Bennington 17·5. The Newark has steamed 19 knots with 8869 horse-power, or a knot more than was estimated. She is at present on detached service in the South Atlantic Ocean.

Gunboats.

Two gunboats, the Machias and No. 6, of 1050 tons and 1600 horse-power, have been launched at Bath. They will steam 14 knots, and will be armed with eight 4-in. quick-firing guns. Commenced in 1891, they are to be completed in 1893. We must not forget to mention the cruiser of 838 tons and 1300 horse-power intended for the training of naval cadets; a torpedo cruiser, the design of which is not yet settled; and finally, a torpedo-boat of 112 tons and 24 knots, laid down in 1891, armed with three torpedo launching-

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tubes and four 1-in. quick-firing guns. The dynamite cruiser No. 2, which was to be armed with three 15-in. dynamite guns, is no longer under consideration.

As has been seen, the United States is building few torpedo-boats. At the present moment her attention is concentrated on ironclads of moderate size, and cruisers, amongst the latter of which Nos. 12 and 13 are remarkable for their large displacement.

Ordnance. The progress in gunnery has been considerable. The Americans have provided their Navy with steel guns, whose initial velocities have reached 2030 ft. They are about to construct a 16-in. gun; they have also acclimatised the manufacture of new powders, as well as that of steel-piercing projectiles. They seem to prefer, however, for their armour experiments, the French chromo-steel projectiles of the Holtzer and Firminy patterns.

Armour. The trials of plates from the different American manufactories took place at Annapolis. According to the official report, the factory of Bethlehem offered an excellent nickel-steel plate, with a face carburetted after the Harvey process, which gave results equal to those obtained last year from Creusot's nickel-steel plates.

State of Navy. But whatever may be the position in the American yards, the state of their Navy afloat is such, the number of modern ships which they can put in commission is so small, that they would have been very much embarrassed if a rupture had taken place with Chili. Like France and Russia, the United States have the disadvantage of having a sea-board on two oceans, which will always make it difficult to concentrate their fleets. To sum up, progress has been very marked. The United States has created in a few years the great industrial enterprises of every kind which are necessary for the building of a ship of war, and it is evident that, in the immediate future, their Navy will have an important position in the world.

New programme. The programme for 1892 has not yet been passed by Congress, which alone sanctions the shipbuilding programme, and, as the majority in the lower House is Democratic, though the President is a Republican, it may be expected that the proposals of the Secretary of State for the Navy will be modified. The latter is now asking that there may be laid down two ironclads of the Indiana type, one fast armoured cruiser similar to the New York, one torpedo cruiser of 800 to 1000 tons and 22 knots speed, and one gunboat of 1200 tons and 17 knots, drawing no more than 9 ft. of water, and intended for operations on the rivers of the South Atlantic Ocean and the extreme east. The administration of the American Navy finally wishes to

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build a certain number of torpedo-boats to be armed with Howell or Whitehead torpedoes, the manufacture of the latter being already undertaken in the United States.

A special Commission has been considering a large proposal for reorganising the *personnel* of officers, and most of its recommendations have been adopted by the Government. The recommendations laid before Congress are intended to hasten promotion, and to judicially arrange the responsibility of every grade on the ships of the American Union.

In 1891 a fleet was mobilised for manœuvres in American waters, and went through some operations of war which were followed with the greatest attention.

Mexico.

A French builder has completed for the Mexican Navy the small cruiser Saragosa, of 1200 tons and 1500 horse-power, intended to serve as a training-ship. She has steamed 15 knots. The Mexican Government aims at establishing a Navy. Hence the purchase of the Saragosa, and the formation of a staff of instructors under an English post-captain.

Argentine Republic.

The English contractors have handed over to the Argentine Navy the two torpedo gun-vessels Rosales and Espora, of 520 tons and 20 knots, and the two sea-going torpedo-boats Commodore Py and the Muratore, of the Coureur tyre, which attained a continuous speed of more than 24 knots on their trials.

Brazil.

The Brazilian Government proposes to increase the Navy; but it is probable that the financial crisis which prevails will prevent it spending as much on the Navy as it desires.

Two cruisers and a training-ship have been ordered.

The cruisers, which are building at Armstrong's, are of the third-class, and are only to steam 14 knots. The training-ship has been ordered from the Forges et Chantiers de la Méditerranée, and is building at La Seyne. She is of 2750 tons displacement and 2800 horse-power, and is to steam 14 knots. She will be armed with eight 14-cm. guns, eight quick-firing 14-cm. guns, and eight smaller pieces, besides four torpedo-tubes.

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CHILI.

The torpedo gun-vessels Almirante Lynch and Almirante Condell were handed over by Messrs. Laird of Birkenhead to the Government of President Balmaceda in time for them to take an active part in the civil war. The Presidente Pinto and Presidente Errazuris, built at La Seyne, were only able get to sea after the issue of the war had already been decided. One of the ships left port without guns, and both were incompletely equipped, and manned by crews picked up at hazard. The ironclad Capitan Prat, built at La Seyne, is about to commence her trials; the engines have already been put in motion in the dock basin. The Chilian Government has asked for estimates for raising the ironclad Blanco Encalada, which was torpedoed in Caldera Bay. They have recently ordered a fast cruiser at an English yard.

JAPAN.

The geographical position of Japan has brought home to the minds of the Government the important *rôle* which might be played by a well-organised Navy. As for England, so for the Empire of the Mikado, the fleet will be the best bulwark of national interests and the best means of defence against invasion. The Japanese are so convinced of this, that though the Parliament, which was dissolved at the beginning of 1892, reduced the expenditure on all the other services, the Navy was provided with new resources for increasing the number of ships of war.

Ships completing.

In 1891 the coast-defence ironclad Itsukusima, which was built in France, completed her trials (she steamed 17·5 knots), and after being accepted, fitted out at Toulon for her voyage to the East. The Metsuchima is completing in the yards at La Seyne. A third vessel of the same type, the Hasidate, built in Japan, will shortly come to France to receive her armament. These ships were designed by M. Bertin, chief constructor of the French Navy. Their armament consists of one 12·8-in. Canet gun mounted in a turret, and eleven 5-in. Armstrong quick-firing guns. The torpedo gun-vessel Shi Sama, of 735 tons, has been launched at St. Nazaire. The trials are not yet completed.

Ships under construction.

There are in course of construction, the Akitsuchima, of the Medea type, in Japan, and a cruiser of 4300 tons and 23 knots, which has been just ordered from Elswick. The Japanese yards are building several gunboats, and are putting together seventeen

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torpedo-boats of 53 tons, which were prepared at Creusot and sent over in sections to Japan.

The Japanese Navy is in fact making great progress; she is borrowing the organisation and the discipline of Western nations. Like her neighbour China, she still orders ships from Europe. The vessels of the Japanese Navy are remarkable for the order in which they are kept, the discipline which is maintained, and the martial spirit which is evinced on board. One cannot say the same of the Navy of the Celestial Empire.

Such is in outline the position of the navies of the world. Every navy is building, according to its resources, ships of every type, without regard to theories, and with full knowledge of the strength and the weakness of the different types of which the best-equipped navies are composed. Every type is, doubtless, open to criticism. Ironclads are necessarily costly when it is wished to combine a high speed, a heavy armament, and effective protection; and when all has been done which science can accomplish, whether with thick armour or division into water-tight compartments, the best ship still remains in a high degree vulnerable. The most powerful cruisers have, in some respects, the same points of weakness which we recognise in the ironclads. If they are less costly they are more vulnerable. In the smaller types bad weather soon tells in the loss of speed in a sea-way. Torpedo-boats have all the disadvantages of a small displacement, and are, in fact, only effective for attack, very perishable, but capable of rendering great services under special circumstances. They cannot contend with heavy seas, and could not accompany a large vessel on an ocean voyage. The part they would play in a naval battle is not as yet demonstrated by experience. For coast defence and for undertaking raids to a limited distance from their base of operations, their value is fully recognised. But neither cruisers nor torpedo-boats will give the command of the sea to a maritime Power, if the enemy has better armed and better protected ships to place in the line of battle. In the universal acceptance of this leading principle of naval strategy, we find the explanation of the fact that the great nations of the world are all building large ironclads, in spite of the pecuniary sacrifices which they entail.

E. Weyl.

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CHAPTER III.

British Naval Manœuvres.

The principal manœuvres of 1891 were designed by the Admiralty to be mainly of a tactical character. This circumstance rendered them at once less interesting and less intelligible to an outside observer than the manœuvres of former years. It may very well be, however, that they were quite as instructive as any previous series to the officers who took part in them, and that the information furnished to the Admiralty by the detailed reports sent in is of the utmost practical moment—all the more so because it has been found both practicable and expedient to treat it for the most part as strictly confidential. A Report on the subject, entitled "The Partial Mobilisation of the Fleet and the Manœuvres of 1891," has been presented to Parliament. This Report appears to contain much less detailed information than usual. At the same time it is the only accessible source of authentic information. With a single exception the Northern and Western Fleets organised for the purpose of carrying out a series of tactical manœuvres were not accompanied by correspondents. The single correspondent who accompanied the Northern Fleet was not made acquainted with the real purpose and character of the evolutions witnessed by him, and in the absence of official information and explanation, he formed no very favourable estimate of the value of the manœuvres carried out. This estimate, however, must now to some extent be revised in the light of the Official Report, and perhaps in the circumstances no better account can be given of the manœuvres of 1891 than by quoting largely from the Report, and interspersing such comments as the passages quoted seem to demand. *Mutatis mutandis*, the same remarks apply, and a similar method will be pursued with respect to the operations of the Red and Blue Squadrons which were engaged in St. George's Channel in a series of torpedo operations of great interest and moment.

The remarks of the Official Report on the subject of the Partial Mobilisation of the Fleet do not seem to call for comment; but the following passage may be quoted for the purpose of comparison with

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the mobilisation of a portion of the French Naval Reserves described on a subsequent page :—

"Orders for the partial mobilisation of the Fleet were received at the ports on the 8th of July. On the 9th the following ships were put in commission at the ports mentioned :— Ships mobilised.

At Portsmouth.	At Devonport.	At Chatham.	At Sheerness.
Hero.	Conqueror.	Sans Pareil.	Barracouta.
Latona.	Thames.	Narcissus.	
Iris.	Forth.	Mersey.	
Barham.	Blonde.	Medea.	
Bellona.	Spider.	Medusa.	
Barrosa.	Sharpshooter.	Salamander.	
Rattlesnake.	Spanker.	Sheldrake.	
Traveller.		Skipjack.	
Seagull.			

"Torpedo-boats Nos. 25, 33, 75, 42,* 82, 83, 84 and 85 † were put in commission at Portsmouth; and Nos. 45, 52, 53, 55, 57, 58, 59, and 60 at Devonport, on the same day. Nos. 65, 67, 73, and 74 had been commissioned at Chatham on the 30th of June.

"The crews of the following ships were completed to full numbers :—

Alexandra.	Iron Duke.	Triumph.	Shannon.
Superb.	Audacious.	Swiftsure.	Northampton.
Invincible.	Neptune.	Hotspur.	Belleisle.

"An important variation in the mobilisation procedure, which had been tentatively introduced during the partial mobilisation of 1890, was definitely adopted during that of the present year. On previous occasions the ships had been put in commission on the second day after the issue of the order to mobilise. The intervening period was devoted to placing certain stores on board the ships—the seamen, marines, and men of other ratings available within the limits of each station being employed for the purpose as 'working parties,' under the direction of the authorities at the ports. Before they can assume command and authority, naval officers must be borne upon the books of one of Her Majesty's ships in commission. Consequently, those who were to join the ships 'mobilised' as soon as the pendant was hoisted could take no part in the preliminary preparations, even—as was now found to be the rule—when, of their own accord, they had repaired early to the port in case their services should be required. In 1890 it was ordered that the hoisting of the pendant should take place on the day following that on which the mobilisation order was issued; and favourable reports as to the result having been received Change in mobilisation procedure.

* Commissioned on the 9th instead of No. 79.
† Subsequently replaced by No. 87.

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from the commanders-in-chief, it was made a regular part of the system. The adoption of this change was due to a recognition of the advantages to be anticipated from putting the officers and men about to serve together in touch with each other as soon as possible. It was not intended to shorten the period of fitting out, which was already considered satisfactory. This matter has been dwelt upon because—when the proceedings of one year are compared with those of another—a knowledge of the change will help to explain any difference of interval between the date of commissioning and that of the starting of the ships for the places of assembly. Exercises periodically repeated during peace have some tendency to depart from reality in course of time, as increased familiarity with the processes leads to an under-estimate of the difficulties that may arise in carrying them out. Owing to the emulation between the several ports, mobilisation has become much more expeditious than some years ago could have been thought possible; and now that the suitable limit of shortness in time appears to have been nearly reached, it is to be expected that competition in future will be less with regard to increased celerity than increased thoroughness of equipment.

Personnel required.

"To man or complete the crews of the several ships and torpedo-boats 6453 men were required; and all were forthcoming. In last year's Report special mention was made of the numbers of signal and engine-room ratings required and available. The conditions this year were even more favourable, a surplus of both classes being left at the ports which would have gone some way towards completing the crews of ships that might be brought forward subsequently, in case of necessity. Fleets are rapidly carried from the peace to the war footing by adding to the ships which are in commission (most of which are abroad) the ships in the home ports ready to be mobilised, that is, to be rapidly commissioned and got ready for sea. The latter will often be of the newest type, carrying the most recent equipment, and their crews will contain a high percentage of Reserve men, specially called out for the occasion. It follows from this that efficiency is likely to be advanced if the Reserves are made to include as large a proportion as possible of men not only passed through a course of drill, but also with some experience of naval discipline and of life on board a sea-going man-of-war."

General purpose of manœuvres.

The general character and purpose of the manœuvres and the composition of the fleets and squadrons taking part in them are described in the following terms:—

"The manœuvres which in former years had followed the partial

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mobilisation had always been of a strategic character. Some purely strategic problems, resembling those with which navies have been, and would be again, confronted in real war, admit of a satisfactory solution in time of peace. In the circumstances in which they arise it is not indispensable, even during genuine hostilities, that the opposing forces should come into actual collision. It has proved sufficient more than once—and it may be expected to prove so again—to so arrange combinations that a superior force can take up a commanding station, and thus paralyse the action of the hostile fleet as completely as though the latter had been encountered and defeated in battle. The permanency of the rules of strategy, which never have been and never can be fundamentally altered, though in no way diminishing their importance, still does permit in the study of them a finality which is quite unattainable in that of tactics. The lessons conveyed by strategic manœuvres are obvious and can be understood by every one, no special professional knowledge being needed to enable an observer to perceive that to have brought a strong force into contact with a weak one is of itself a success.

Permanency of rules of strategy.

"On the other hand, though the general principles remain the same, and though some instruction, even in tactics, is still to be derived from the history of former wars, tactical methods are modified more or less by every change in *matériel*, and the art, if not progressive, is, at all events, variable. The lessons conveyed by tactical manœuvres are rarely apparent at once. The processes themselves cannot be made intelligible beforehand to all, even of those who took part in them. It is not until reports have been studied that the results appear. The full significance of manœuvres of the kind can be realised only after a close examination of the records of proceedings. Looked at from one point of view, a scheme of strategic manœuvres on a great scale has advantages which encourage their frequent repetition; and only a recognition of the pressing necessity of providing opportunities for the experimental investigation of tactical problems, prevents the former from being adopted always as the annual exercise.

Tactical methods are variable.

"The greater wars in which this country has been involved have illustrated over and over again the advantages accruing to the side which enters into a contest furnished with the knowledge derived from study of, and training in, the tactics likely to be suitable to the *matériel* of the day. From the early part of the eighteenth century till late in the War of American Independence, success was usually the result of the better strategy which enabled the victorious fleet to go into action numerically superior to the enemy. That,

Success in war due to better strategy.

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notwithstanding the superiority of force against it, the worsted fleet often escaped annihilation, was due to the familiarity of its officers with tactical methods and the skill with which their knowledge was applied. It is now perceived that the so-called 'misconduct,' which was punished with extreme severity in the earlier part of several eighteenth-century wars, was not due, as was supposed, to want of loyalty or want of courage, but to insufficient acquaintance with the methods and principles of tactics and the defective signalling systems of the age.

Distribution of ships.

"In previous annual manœuvres it had been necessary to put both contending fleets on something like an equality as regards the capabilities of the ships assigned to each. A plan of distribution had to be adopted which was, in effect, a choosing of sides. The contending fleets, therefore, were unavoidably made up of heterogeneous elements; and their composition bore but a faint resemblance to that of the fleets likely to be organised in war. It was recognised that much instruction might be derived from manœuvres that could be executed by more homogeneous bodies, especially as forming them would make it possible to work, as a whole, a force composed of ships of recent type, powerful armament, and considerable speed. Without an arrangement of the kind, it would not have been practicable to carry out operations which would help to solve questions connected with matters so important as the scouting and look-out services of fast-moving modern fleets. At the same time, a closer study of the methods of torpedo-boat warfare would be possible by arranging a separate series of manœuvres specially with a view to their investigation.

Two sets of manœuvres.

"It was, therefore, decided, when the partial mobilisation was complete, to carry out two distinct sets of manœuvres. For the principal, which were to be of a tactical character, and were to consist of a series of exercises to be performed by two independent fleets, by far the larger number of ships was told off. These were distributed as follows:—

THE 'NORTHERN FLEET.'

Vice-Admiral Sir Michael Culme-Seymour, Bart., Commanding.
Rear-Admiral Loftus F. Jones, Second-in-Command.

Places of Assembly { 1st. *The Downs.* 2nd. *Frith of Forth.*

Camperdown.	Conqueror.	Pallas.	Ruby.
Anson.	Hero.	Latona.	Tartar.
Howe.	Aurora.	Medea.	Speedwell.
Rodney	Immortalité.	Medusa.	Salamander.
Nile.	Iris.	Active.	Sheldrake.
Sans Pareil.	Mersey.		

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THE 'WESTERN FLEET.'

Rear-Admiral R. O'B. FitzRoy, C.B., Commanding.
Rear-Admiral N. Bowden Smith, Second-in-Command.

Places of Assembly { 1st. *Portland.* 2nd. *Berehaven.*

Alexandra.	Neptune.	Forth.	Volage.
Superb.	Swiftsure.	Barham.	Calypso.
Invincible.	Triumph.	Bellona.	Sharpshooter.
Iron Duke.	Narcissus.	Barrosa.	Spanker.
Audacious.	Thames.	Blonde.	

"For the secondary manœuvres, which were to take place in the St. George's Channel, two squadrons were formed, and were composed as follows:—

THE 'RED' SQUADRON.

Captain S. Long, A.D.C., Commanding.

Places of Assembly { 1st. *Torbay.* 2nd. *Milford Haven.*

Hotspur.	Barracouta.	Spider.	Gossamer.
Shannon.	Seagull.	Skipjack.	Rattlesnake.
Northampton.			

THE 'BLUE' SQUADRON.

Rear-Admiral J. E. Erskine, Commanding.

Places of Assembly { 1st. *Falmouth.* 2nd. As ordered by Rear-Admiral Erskine.

Belleisle.	Travelle	Torpedo-boats Nos. 25, 33, 42, 45,
Hecla.	Hearty.	52, 53, 55, 57, 58, 59, 60, 65, 67,
Curlew.	Magnet	73, 74, 75, 82, 83, 84, 87.

"In connection with the St. George's Channel manœuvres the following officers were nominated umpires:—Admiral H.R.H. the Duke of Edinburgh, K.G., Rear-Admiral Richard E. Tracey."

Observations on composition of Fleets.

The Northern Fleet thus consisted of an ironclad squadron capable of manœuvring at ten knots speed, and of steaming on an emergency at a speed of twelve knots or more, together with a complement of cruisers of the newest and fastest type. The cruisers of the Western Fleet were of a similar character, but its battleship squadron was older in the type and structure of the vessels composing it, and was probably incapable of manœuvring at more than seven knots or of steaming at more than nine. The significance of this latter circumstance will be discerned when we come to certain details of the manœuvres. Both fleets engaged at first for a period of some days in a series of preliminary exercise with no specific strategic or tactical character, and it was not until they had completed with coal at their second rendezvous that the tactical part of the programme

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was opened. To judge from the Report, the attention of both fleets was principally and almost exclusively devoted to experiments in the practice of scouting, but it would not perhaps be safe to infer that this was really the case. The Report deals only with such questions and results as can be discussed in public without injury to the public service, such other results as were obtained in the course of the operations being regarded as strictly confidential. Such a sentence as the following, for example, probably means a good deal more than it says:—"In the tactical manœuvres carried out by the Western Fleet on the 27th and 28th of July, each column represented an opposing fleet, the crews being at quarters, aiming at passing ships and firing blank from small ordnance." It is known from independent sources that a similar series of operations was carried out by the Northern Fleet, though no mention of the fact is to be found in the Report. It may safely be assumed that the omission is not due to any want of appreciation at the Admiralty of the importance and novelty of the results attained, and it is probable that the influence of these results will be distinctly traceable in the design and armament of the three new battleships whose immediate construction is promised by the First Lord of the Admiralty in his annual Statement for the current year. However this may be, it is to the scouting operations of the principal manœuvre fleets that the Report is almost exclusively devoted. In the following passage the proceedings of the Western Fleet are described:—

Proceedings of Western Fleet.

"The Western Fleet began its manœuvre cruise on the 23rd of July, and arrived on the 1st of August in Torbay prior to the dispersal of the ships. On leaving Berehaven the fleet was given a special organisation, and Rear-Admiral FitzRoy issued detailed instructions with respect to his cruisers.

"The Rear-Admiral's instructions concluded with pointing out that it was not desirable to have many rules or special orders for scouting, look-out, or torpedo vessels, as the manœuvring of vessels of these kinds must largely depend on the judgment of their captains.

Scout Squadron.

"The Scout Squadron was detached under the orders of Captain C. Johnstone of the Narcissus on the 23rd of July, with directions to scout as though for an enemy advancing from the south; and on the sixth day out it was to look for and find Western Fleet and endeavour to gain information of its strength until chased off by superior force. The Rear-Admiral regarded this detachment as a skeleton squadron, the Narcissus and Barham, of which it consisted, being types of the sort of ships to compose such a force; cruisers strong enough to engage the most powerful cruiser of an enemy if surprised, and others

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of great speed to carry information. Captain Johnstone's report brings out clearly the difficulties in the way of obtaining information concerning a fleet which has its cruisers well disposed around it. He says that on the morning of the 28th he steered so as to find the fleet. 'At 2.5 P.M. a hostile cruiser was sighted to the W.S.W.; and shortly after, other cruisers and a body of large ships were observed, when we altered course towards them.' 'Our proximity to the enemy,' he adds, 'made us liable to sustain heavy, but not fatal, damage.' Though before increasing his distance from the main body of the force sighted, he made out seven large vessels, besides a battleship in chase, and eight cruisers, large and small. 'The seven vessels were evidently of large size; but I do not think,' he says, 'our reconnoitre could be relied on to determine their class'; and this notwithstanding that the atmosphere was very clear, which facilitated reconnoitring at a distance. It is remarkable that the same uncertainty as to the exact characters of ships sighted by scouts was noticed a few hours later in the North Sea by Captain P. Aldrich looking with the Mersey and Pallas for the Northern Fleet. Similar experience in such different circumstances may, in the as yet limited state of our knowledge of systematic scouting, be taking as corroborating the view that a reconnaissance to be of value must be pushed home, and that fleets which have their cruisers so disposed as to prevent its being pushed home, have frustrated the reconnoitrer's object. This points to the importance of practice in scouting, and in the measures to be taken to prevent an opponent's scouting from being productive of information."

Observations on reconnoitring.

Some exception may perhaps be taken to the foregoing reasoning. It appears that, in spite of the skilful disposition of the cruisers belonging to the fleet to be reconnoitred, Captain Johnstone did succeed in sighting the battleships, and did manage to count them accurately, though without much confidence in the precision of his observation or the accuracy of his reckoning. In some cases, no doubt, a reconnaissance so incomplete and so uncertain in its results would be of little avail, and might be regarded as a failure; but in many other cases it would satisfy all such purposes as a reconnaissance so conducted could reasonably be expected to satisfy. In many cases, for example, the general character and composition of a fleet would be known to an enemy on the look-out for it, and the chief object of the reconnaissance would be to ascertain its exact whereabouts. When a scouting cruiser observes successively, first, a single hostile cruiser, then several other cruisers, and finally a body of large ships, she is surely entitled to draw the conclusion that she

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has discovered the fleet she was sent out to look for, even though she is not able to determine the exact class of the large ships observed, or to be quite certain that she has seen them all; and the hostile admiral to whom she makes her report would probably be able in most cases to make a very shrewd guess at its meaning. There is, of course, no disputing the truth and pertinence of the remark in the Report concerning "the importance of practice in scouting, and of the measures to be taken to prevent an opponent's scouting from being productive of information"; but, taken by itself, it is rather a meagre result of a series of operations lasting over six days.

Northern Fleet.

A similar reflection would seem to apply to the scouting experiences of the Northern Fleet as described in the Report:—

"The Northern Fleet left Queensferry for the manœuvre cruise on the 25th of July, and anchored before dispersion off Deal on the 4th of August. Vice-Admiral Sir Michael Culme-Seymour arranged two distinct organisations of the fleet.

Scouting operations.

"On the 27th of July the Mersey and Pallas were detached to a distance, with directions to search, on the following day, for the fleet, which would be within an area eighty miles long by forty miles broad. Captain Aldrich directed the Pallas to cross the area from north to south, on a line at about ten miles from its western edge, whilst he himself in the Mersey crossed it in a north and south line from its eastern edge. The weather on the morning of the 28th of July was fine and clear; but about the middle of the day it became very squally, with heavy showers and thick banks of cloud. The Mersey and Pallas were ordered to cross the prescribed area between 8 A.M. and 8 P.M., and endeavour to gain information of the fleet without being discovered. The fleet was not seen from the Mersey, though at one time it appears to have been only far enough off to be just out of sight. Captain Aldrich observes: 'What was thought to be smoke was seen from the Mersey, but it was by no means certain that it was; and, at all events, I could not report that I had sighted what appeared to be a fleet.' Captain MacLeod, of the Pallas, says that, at 10.50 A.M. on the 28th of July, 'columns of smoke, as if from the funnels of seven or eight ships in a body, were distinctly seen bearing about S.S.E., probably fifteen to twenty miles.' He adds that, 'At 2 P.M. the columns of smoke at equal distances from each other gave all the appearance of ships in line ahead or abreast, but before movements by bearing could be noted, a dense rain-bank passing between this ship and them completely obscured the latter, and we did not again see them.' These reports demonstrate two things: first, that small matters, such as a passing rain cloud, are apt to

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frustrate a deliberate reconnaissance at sea; second, that a fleet, even when confined to a comparatively small area in an exactly known position, is not unlikely to escape detection by scouts especially sent to look for it. These conditions may have been recognised beforehand to some extent; but it is one of the advantages of tactical manœuvres that it illustrates them practically and thus enforces recognition of them."

Observations on.

The results in this case are purely negative. Even so, it appears that one of the two cruisers, the Pallas, saw columns of smoke for the greater part of three hours, and that at one time during that period they indicated "all the appearance of ships in line ahead or abreast." By altering his course, therefore, in the direction in which the smoke was observed, he might, it would seem, have pushed his reconnaissance further home unless restrained by orders to the contrary. If such orders were given, they would appear to be more or less inconsistent with the ostensible purpose of the reconnaissance, and in any case to have vitiated its results. If such orders were not given, we are left without any adequate explanation of the course pursued by the Pallas. Such would appear to be the only results of the tactical manœuvres proper carried out by the two fleets which the Admiralty think it expedient to make public. The reflection is obvious and irresistible that, unless the results not disclosed were of vastly greater importance, the information derived from the manœuvres of 1891 was very far from being commensurate with the means employed to obtain it.

Further operations in English Channel.

A further operation of considerable magnitude and duration was, however, carried out by the Northern Fleet. It is described in the Report as follows:—

"It was laid down in the plan of the manœuvres that it was to be assumed that the Northern Fleet might have to encounter a nearly equal hostile fleet cruising in a particular quarter, and that this consideration should govern generally the execution of the tactical manœuvres. In order to test the value of the experience gained by the scouting exercises already carried out, orders were issued by the Admiralty on the 30th of July to the following effect:—An enemy's fleet had been sighted at the entrance of the English Channel, and was known to be proceeding towards the Straits of Dover, with probably one of the following objects:—

Plan of.

"(*a.*) To enter the Thames.

"(*b.*) To effect a junction with another hostile fleet whose operations were confined to the Baltic.

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"The Northern Fleet was to try to frustrate either of these objects by preventing the enemy's fleet from passing east of the Straits of Dover. The Vice-Admiral in command was not to pass west of the Straits with his battleships, but his scouts might search the Channel as far west as the longitude of St. Catherine's Point. The coast of Great Britain was to be considered neutral, so that no information could be obtained from coastguard or signal stations.

Admiral's dispositions.

"The above order was received by the Vice-Admiral on the same day at 1.15 P.M., and he at once ordered steam for full speed, and proceeded towards the Straits of Dover. The following cruisers were detached under the orders of Captain Fanshawe, of the Aurora, to scout between the Isle of Wight and Cape Barfleur, seven miles apart:—

Aurora.	Iris.	Pallas.
Mersey.	Latona.	Medusa.

"And the following, under Captain Sir William Wiseman, of the Immortalité, to form a line south of the Royal Sovereign lightship:—

Immortalité.	Medea.	Tartar.

"The battleships reached the Straits of Dover at 7 A.M. on the 31st of July. Sir Michael Culme-Seymour then cruised with them east of a line drawn from the South Foreland to Cape Grisnez until 1 P.M. on the 1st of August, when he anchored near the South Sands lightship, keeping the 'torpedo gunboats' looking out to the south of it.

Distances to scene of operation.

"The sun rose at 4.22 A.M. on the 30th of July, and it may be assumed that by 4 A.M. it was light enough to distinguish the enemy's fleet, which was reported at 'daylight' at the entrance of the English Channel. The distance between a line drawn from Scilly to Ushant and the Straits of Dover is 300 miles. A hostile force having once entered the Channel would be nearly sure to proceed at high speed towards its objective, so that it may be assumed that this new fleet would have got to the Straits of Dover perhaps by 4 A.M. on the 31st, but (as no large fleet of armoured battleships yet in existence can—whilst preserving its formation—keep up for a long speed of much more than twelve knots) not sooner. The distances from the Scilly-Ushant line to the St. Catherine's-Barfleur and the Royal Sovereign lines are 180 miles and 240 miles respectively. The enemy, therefore, might have been expected to be opposite St. Catherine's at about 7 P.M. on the 30th of July, and opposite the Royal Sovereign at about midnight.

"From the mouth of the Humber to the St. Catherine's-Barfleur

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line the distance is 300 miles, and to the Royal Sovereign line 240. The Northern Fleet at 1.15 P.M. on the 30th of July, when the information of the hostile fleet's approach reached it, was to the northward of the Humber, and consequently at least as far from the lines mentioned as the above distances. At an average speed of fifteen knots it would have taken the northern cruisers sixteen hours, or until 5.15 A.M. on the 31st, to reach the line drawn south from the Royal Sovereign, and twenty hours, or until 9.15 A.M. on the 31st, to reach the St. Catherine's-Barfleur line. Captain Fanshawe reports that his division of scouts averaged 14·6 knots; and Sir William Wiseman reports that his squadron, apparently for a part of the time, proceeded at fifteen knots, so that the assumed speed was not exceeded. As a matter of fact, the divisions of cruisers reached the Royal Sovereign line at 10 A.M. and 10.30 A.M. on the 31st, by which time, if the enemy had maintained his rate of speed of rather more than twelve knots an hour, he must have already passed the Straits of Dover. The ships of the outer division of scouts were spread to their stations, so as to be seven miles apart on the St. Catherine's-Barfleur line, at 10 A.M., when five miles south of the Royal Sovereign shoal. The ships of the inner division of scouts were spread on the Royal Sovereign line at 10.30 A.M.

Time taken to reach it.

"Scouting operations will usually be arranged under the influence of two different feelings, viz., a desire to obtain information as soon as possible, and a desire to make as certain as possible of obtaining accurate information. Under the influence of the first, scouts will be sent out far in advance; under that of the second, they will be so placed that an approaching enemy will be unable to pass through their line unobserved. When it is known that an enemy intends to approach in a certain direction, the first requirement will be to fix approximately the line at which the scouts and the enemy, the speed of the former being known, and that of the latter being assumed, will meet. The scouting line cannot be more advanced than this, and if a narrowing of the waterway occurs a fair distance in rear of it but still in advance of the fleet, the position of the line will be marked out with sufficient precision."

Report on scouting operations.

It is not very easy to follow the foregoing reasoning. The only real fleet which Sir Michael Culme-Seymour could expect to encounter was the Western Fleet. So far from this fleet being able to steam at a speed of "rather more than twelve knots," it would have found it very difficult to steam even at nine knots for a continuance. If, then, it was this fleet that Sir Michael Culme-Seymour was directed to prevent from passing east of the Straits of Dover, his

Criticism of Report.

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scouting dispositions are not open to the implied criticisms of the official commentator. If, on the other hand, it was a purely imaginary fleet capable of steaming "rather more than twelve knots," not only was it rather misleading to instruct him "that his scouts might search the Channel as far west as the longitude of St. Catherine's Point," but he was required to accomplish a task which the official commentator shows to have been little short of impossible. If the imaginary hostile fleet was assumed to be capable of steaming more than twelve knots, it would, on the writer's own showing, have reached the Straits of Dover at or about 4 A.M. on the 31st of July. The advanced cruisers of the Northern Fleet would have reached the same point a good deal later, as their speed was taken at an average of fourteen to fifteen knots, and they reached the longitude of the Royal Sovereign, sixty miles further to the westward at 10 A.M. The battleships of the Northern Fleet actually reached the Straits of Dover at 7 A.M., so that the imaginary hostile fleet might have passed into the North Sea without having been seen either by the cruisers or by the battleships of the Northern Fleet, and this result must have been foreseen by Sir Michael Culme-Seymour if he had been authorised to assume that the speed of the imaginary hostile fleet was rather more than twelve knots. If, on the other hand, he was not told that the hostile fleet was imaginary, and that its speed was assumed to be more than twelve knots, he could only suppose that the fleet he was required to encounter was the Western Fleet, and on that assumption his dispositions were unimpeachable.

Nevertheless, inasmuch as the whole proceeding is now represented as hypothetical so far as the existence and movements of the hostile fleet are concerned, the following account of the actual proceedings of the cruisers of the Northern Fleet is sufficiently instructive and significant. It speaks for itself, and requires no further comment:—

Proceedings of Cruisers of Northern Fleet.

"One of the special difficulties of scouting service will be that of testing the value of information when the evidence is scanty, and perhaps conflicting. There was a remarkable illustration of this difficulty during the present operations. The Mersey, at the Cape Barfleur end of the line, between 9 and 10 P.M. on the 31st of July sighted five steamers coming down in two groups, which led to the belief that they might be a portion of the enemy's fleet. This was communicated to the Medusa. The latter closed, and passed on the intelligence to the senior officer in the Aurora, who, as soon as he could signal to her, sent the Pallas to communicate it to the Immortalité, in the second line of scouts. Later on, the Aurora

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sighted the Iris steaming fast to the eastward, apparently on the heels of the enemy's ships. The Aurora accordingly followed her, until the Pallas, returning from the Immortalité, was met with. The last-mentioned ship had received information from a German steamer that five men-of-war had been seen south of Brighton. The next intelligence was a report from the Tartar that four of the enemy's cruisers, one judged to be the Narcissus of the Western Fleet, had passed to the eastward. The Medea had informed the Tartar that an enemy's cruiser had challenged her, and, as she did not answer, had put out her lights and had disappeared. Then came the Pallas, announcing that she had been sent by the Aurora to report that five steamers, believed to be the enemy, had passed between the southern scout and the French coast. Three independent sets of witnesses agreed that five * steamers had passed, going to the eastward. The only discrepancy was between the Mersey's report that they had passed near the French coast, and the German's report that they had passed south of Brighton. This discrepancy could be explained by assuming that the enemy had kept well to the southward to avoid detection till near Barfleur, and had then headed so as to pass close round Dungeness. The evidence that a squadron of the enemy had passed east was strong, and information to that effect was brought to the Admiral; nevertheless, there had been no cruisers except the Northern Fleet's own scouts anywhere near, and none had passed east of St. Catherine's."

St. George's Channel Manœuvres.

We now come to the torpedo operations of the Red and Blue Squadrons in St. George's Channel, and here it will perhaps be best to let the Official Report speak for itself:—

"RED AND BLUE SQUADRONS.

"The St. George's Channel manœuvres, though generally strategic in scope, still had, to some extent, the character of a tactical exercise. The objects were:—

"(*a.*) To ascertain the tactics which would probably be adopted by flotillas of torpedo-boats stationed at several points on one shore of a channel in order to harass or destroy an enemy's ships, &c., operating in the Channel, or lying at anchorages on the other shore.

"(*b.*) To ascertain the measures which should be taken to give security against the attacks of these torpedo-boats.

* The Tartar reported having seen four, and the Medea, 45 minutes earlier, one; which would account for the five of one set of witnesses.

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General idea.

"According to the 'general idea,' a series of torpedo-boat stations had been established on one side of a strait. From these stations torpedo-boats might come out to act against an enemy's ships, &c., using anchorages on the opposite shore, or cruising in the neighbourhood. The ships, &c., would endeavour to prevent the torpedo-boats from injuring them or interfering with their operations.

"A certain portion of the east coast of Ireland was assumed to be the territory of one side called the 'Blue,' and within its limits six torpedo-boat stations were established, for the purposes of the manœuvres. A certain portion of the west coast of Great Britain was assumed to be the territory of the other side, called the 'Red.' The remaining coasts of the United Kingdom were assumed to be neutral. The limits of the manœuvre area were:—

"On the North—55° 30′ North latitude.
"On the South—51° North latitude.
"On the East—The Western Coast of Great Britain between 51° and 55° 30′ North latitude.
"On the West—From 55° 30′ North latitude, and 6° 30′ West longitude to the Irish Coast, then the Eastern Coast of Ireland to 8° 30′ West longitude, and then to 51° North latitude.

Composition of Squadrons.

"All the torpedo-boats, twenty in number, were attached to the Blue Squadron, which also included the Belleisle, Hecla, Curlew, Traveller, Hearty, and Magnet, to serve as parent ships for the boats, and to represent the establishments which would be erected at regular torpedo-boat stations. Two divisions contained the whole of the six stations, to each of which not less than three torpedo-boats were to be assigned. To the Red Squadron belonged three armourclads, each provided with net-defences. These ships were to form a 'skeleton' armoured fleet which would be open to, and could defend itself against, torpedo-boat attacks in the usual manner. In previous manœuvres, both at home and on foreign stations, it had been customary to provide merely passive or local defences against such attacks. It was considered desirable to give facilities for trying the effect of offensive tactics against the torpedo-boats themselves. For this purpose the Barracouta and five fast gunboats, the Seagull, Spider, Skipjack, Gossamer, and Rattlesnake, were attached to the Red Squadron as 'torpedo-boat catchers.'

Three sets of instructions.

"It had been the practice hitherto to issue to both sides one set of orders or instructions for guidance during manœuvres. As this

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was likely to give each side some clue to the action of its opponent, it was decided this year to divide the orders into three portions. One, containing the rules and general instructions, was communicated to both sides; a second portion, containing special orders for the Red Squadron, was communicated to the Red side only; whilst to the Blue side alone was communicated the special orders relating to the Blue Squadron. By this means the manœuvre scheme was made to accord more closely with conditions of real war, at the beginning of which each belligerent may be credited with a certain knowledge of the strength and disposition of his enemy's forces, though he would probably be ignorant of the latter's intended plans and of the orders sent to him by his Government. Each side was separately informed that the latest intelligence as to the enemy's force and disposition would be communicated to it. The Red Squadron was permitted to use the anchorages at Milford Haven, Holyhead, Luce Bay, Lough Ryan, and Campbelltown, at the discretion of the senior officer; but, except for reasons of navigation, visits were not to be made to other ports.

Sphere of torpedo-boats.

"There are several parts of the world in which fleets might have to operate in time of war where they would be exposed to attack from torpedo-boats only. In the localities alluded to, the torpedo-boats are not likely to be supported by larger vessels, in some cases because the hydrographical conditions would hardly permit it, and in others because it would lead to an unsatisfactory disposition of the cruiser force. The stations of the hostile boats would have been selected and fitted up in time of peace, perhaps long before the beginning of hostilities. If found unsuitable, the unsuitability would not make ifself felt till operations were in progress, when the establishment of new stations might be difficult and would certainly take time. Nevertheless, a redistribution of the boats might be effected at short notice. Consequently, it was laid down as to the Blue Squadron, which, as regards the offensive, consisted exclusively of torpedo-boats, that each one of the stations on the east coast of Ireland was to be occupied, at the beginning of the operations, by a group of not less than three boats. Permission was given to rearrange the disposition of the boats after the operations had begun, provided that no place still retained as a station should have less than two boats, and that no new station was established. The object of this arrangement was to permit the boats of the Blue Squadron to be distributed as desired, subject to the above conditions.

"'Hostilities' began at noon on the 22nd of July, the Red Squadron

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being concentrated in Milford Haven at the time, and the Blue Squadron being disposed as follows :—

WATERFORD :—
Curlew.
Torpedo-boats Nos. 60, 58, 57 and 45.
Collier Avon.

WEXFORD :—
Magnet.
Torpedo-boats Nos. 33, 65 and 75.
Collier Pansy.

WICKLOW :—
Traveller.
Torpedo-boats Nos. 59, 55 and 53.
Collier Joseph Ricketts.

KINGSTOWN :—
Belleisle.
Torpedo-boats Nos. 82, 84 and 85.

CARLINGFORD :—
Hearty.
Torpedo-boats Nos. 67, 73 and 74.
Collier Grimsby.

CARRICKFERGUS :—
Hecla.
Torpedo-boats Nos. 25, 83, 42 and 52.

Principles of operations.

"The plan of operations which each side intended to follow was based on certain general principles which will be summarily explained. Directly 'hostilities' began, the harbours which were available for the ships of the Red Squadron were to be examined by the Blue torpedo-boats, and were to be constantly searched during the operations. The boats of the Kingstown group being of extra speed were to carry out general search and patrol. Each of the other five groups had a distinct sphere of action allotted to it, so that all the anchorages of the Red Squadron, from Campbelltown to the Bristol Channel, and the waters in their immediate neighbourhood, would be searched, and the Red ships encountered in them be harassed or attacked. The plan of the Red Squadron included both offensive and defensive action. A squadron, consisting of the Skipjack, Seagull, and Gossamer, was formed to carry the war into the 'enemy's' own waters, and compel his torpedo-boats to submit in their turn to be attacked.

Hostilities July 22nd.

"When at noon on the 22nd of July 'hostilities' began, the several groups of Blue torpedo-boats started on the lines allotted to them. The Red 'Detached Squadron,' in which the Rattlesnake had temporarily replaced the Skipjack, was despatched to reconnoitre Wexford; the Red 'Cruiser Squadron' was sent to patrol

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the waters outside Milford Haven; and inside the haven the Red armourclads, with net-defences out, shifted berth to an anchorage between Dale Point and Stack Fort. At 7.10 P.M. the Rattlesnake signalled three torpedo-boats astern, and the Red Detached Squadron, which was near the Tuskar Light, chased them till dark. Three boats, Nos. 33, 65 and 75, approached Milford Haven and ascertained the presence of the Red vessels by finding a cluster of catchers guarding the entrance of the haven. The night being very light, it was considered that there would be no chance of eluding the catchers or of making an attack with any prospect of success, so the torpedo-boats retreated before their swifter foe. On their way back on the following morning they fell in with the Detached Red catchers, which drove two into Wexford and 'captured' the third, No. 65, whose steering-gear had broken down.

"On the 23rd the Red armourclads proceeded to South Stack, near Holyhead. The detached squadron approached Wicklow and fired on the torpedo-boats and depôt-ship, the fire being returned by the latter and by the Artillery Militia. It appeared off Kingstown in the afternoon and exchanged fire with the Belleisle and the forts. Torpedo-boats 82, 84, and 85, which had been chased for an hour and a half by the Red Detached catchers, made for Wexford and put into Rosslare, where 82 remained, whilst the others returned into Kingstown. July 23rd.

"On the 24th the Red Squadron attacked Kingstown in form, and by remaining within the regulated distance for the regulated time, effected the 'capture' of that station. No. 82 torpedo-boat, which had met with an injury to her propeller, was taken in tow on the 23rd by No. 75, and towed as far north as Dalkey Island, where on the next morning she was cast off and proceeded at slow speed. When near Kingstown—off which the Red Squadron, as above observed, was remaining in force—82 was attacked by the Rattlesnake and was claimed as 'captured,' the claim being confirmed by the umpires. The decisions of umpires being final have to be accepted without comment or protest, and cases in which they have adjudicated cannot be discussed in a report. But there are peculiar features in the case of No. 82 which may be pointed out. Had she entered Kingstown Harbour, which it is stated she could have done unperceived, she would have claimed to share the fate of that station, and be 'put out of action' for thirty-six hours—under Section 9 of Special Orders to Blue Squadron. It was, however, considered preferable to risk being attacked by the Red vessels, in which event she might have claimed to be put out of action for only twenty-four July 24th.

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hours, under General Rule No. 16. Encountering a hostile vessel, when her defective propeller had reduced her to the necessity of being towed or proceeding at slow speed, rendered No. 82 liable to the operation of another General Rule No. 9. No. 75 was also adjudged to have been 'captured.'

Gossamer puts three torpedo-boats out of action.

"Lieutenant H. Orpen, in No. 59 torpedo-boat, together with Nos. 53 and 55, left Wicklow at 8.40 A.M. on the 24th of July, to look up Holyhead and the Red Squadron then operating off Queenstown. Having detached 53 and 55 to Holyhead, 59 eventually approached the entrance of the harbour at 12.30 P.M., and found there No. 55, No. 53 having gone up the bay to reconnoitre. At 12.45 P.M. a message from South Stack Signal Station informed the Gossamer, which had gone into Holyhead to coal, that torpedo-boats were in sight. She left the harbour and found one boat coming in. This boat turned round to join the two others. The three boats formed in single line ahead, and proceeded to sea at full speed, the Gossamer continuing in chase. When the latter was believed to be 2000 yards distant, the torpedo-boats turned round together and assumed attack formation. Each side claimed the victory; and on reference to the umpires, torpedo-boats 53, 55, and 59 were adjudged to have been put out of action.

Night attack on Red Squadron.

"The Red Squadron continued its course for Belfast Lough, off which it arrived early on the 25th of July. Captain Long reports that 'the night was very dark, the moon being obscured by clouds, and consequently, the water being smooth, it was a very favourable one for torpedo-boat attack.' At 11.30 P.M. on the 24th a number of lights were seen from No. 74 torpedo-boat patrolling off Carlingford, which it was considered certain were the 'enemy.' It was decided to pass in rear of the line and attack the last ship, which turned out to be the Northampton. There is a considerable difference in the times as noted by both sides, and by ships of the same side. The torpedo-boat came up on the port quarter of the Northampton, believing that she was unobserved, and that the fire from the armour-clad at first was chiefly directed on the latter's starboard beam. In the Red Squadron, on the other hand, it was reported that the torpedo-boat was observed from the lookout ship Spider, and also from the Northampton, which ship went full speed ahead and altered course so as to bring the torpedo-boat more astern. The latter, when she was at an estimated distance of 150 to 200 yards, fired her starboard torpedo and hit the Northampton. Claim and counter-claim having been made, No. 74 was adjudged to have been put out of action for twenty-four hours.

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"When Belfast Lough was reached it was found that the Hecla had so efficiently protected herself that she could not be put out of action, so the Red Squadron proceeded to Luce Bay, where the armourclads anchored at 2 P.M. and rigged net-defences. At 11 P.M. the Spider had an engagement off the Mull of Galloway with five torpedo-boats, which she claimed to have put out of action, but the claim was disallowed by the umpires. During the night of the 25th–26th of July, the armourclads in Luce Bay were twice attacked. Rear-Admiral Erskine reports that two of the boats could not get near the ships on account of the catchers which were on patrol outside. No. 42 claimed to have torpedoed both the Northampton and the Shannon; the ships, however, had their net-defences in place. At 2.50 A.M. No. 83 also attacked the Northampton. The claim that the Shannon and Northampton had been put out of action was not confirmed. The claim against No. 83 was allowed, and No. 42, which was chased by a catcher and caught, was also put out of action.

Attacks on Red Squadron in Luce Bay, 25th–26th July.

"Early on the 27th of July another attack was made on the Northampton in Luce Bay by No. 25, but the torpedo failed to run, and the boat was put out of action. Rear-Admiral Erskine, having learned that the Red Squadron was in Luce Bay, had availed himself of the permission given by Section 6 of the Special Orders to the Blue Squadron, and, in order to concentrate the boats within striking distance of his enemy's position, had ordered Nos. 33, 53, 55, 59, 75, 84, and 85 to Belfast, to which station Nos. 25, 42, 52, and 83 already belonged. This concentration will explain the frequency of the attacks made on the Red Squadron, which was, whilst at Luce Bay, less than 40 miles from the Belfast torpedo-boat station.

27th July.

"At 9.30 A.M. on the 27th, whilst Lieutenant L. Bayly, in No. 60 torpedo-boat, with Nos. 57 and 58 in company, was proceeding from Ardglass to Belfast, he sighted three torpedo-catchers standing to the eastward about ten miles off. No. 60 signalled to 57 and 58 to keep the vessels in sight, but to conceal themselves whilst she communicated with Ardglass Station. At 3 P.M. No. 60 returned, and found Nos. 57 and 58 hidden behind Lambay Island, north of Dublin, whilst one catcher, the Gossamer, was south of the island standing to the westward. The three boats steered so as to come down on the catcher's port bow and hem her in between themselves and the island. The Gossamer opened fire, and the boats claimed to have beaten her. The Gossamer, on the other hand, claimed to have captured the boats. Her 'claim,' as preferred, was not allowed, but the three torpedo-boats were adjudged to have been put out of action for twenty-four hours.

Gossamer and three torpedo-boats.

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28th July. "The Gossamer had been reconnoitring the Irish coast with the Seagull and Skipjack under Lieutenant Maitland-Dougall of the last. In the afternoon, the Skipjack and Seagull approached Wicklow, and were received with the fire of the Traveller and the 64-pounders on shore. This was followed by the appearance of the Red Squadron in force off the place on the morning of the 28th. Whilst the ships were on their way a series of attacks were made on them by torpedo-boats. At 1.5 A.M. two were reported as coming up right astern of the Northampton, one of which fired a torpedo that failed to run. At 2.35 A.M. a second boat was reported ahead and was then lost sight of; and at 3.40 A.M. a third was reported coming up astern. A claim that the Northampton had been torpedoed was not confirmed; whilst one boat, number unknown, was adjudged out of action for twenty-four hours. At 2.30 A.M. Nos. 57, 58, and 60 attacked H.M.S. Rattlesnake. Their claim to have captured her was not confirmed, but the boats were put out of action for twenty-four hours. The Red Squadron effected the 'capture' of Wicklow Station during the afternoon.

29th July. "On the 29th of July the Red Squadron again arrived at Milford Haven. The armourclads rigged their net-defences, and the Barracouta and Seagull were anchored so as to represent shore electric light stations, and cross the beams of their search-lights at the entrance. Between 1.35 A.M. and 2.10 A.M., on the 30th, No. 84 torpedo-boat attacked the Shannon, and No. 45 the Northampton. One of No. 84's torpedoes missed the ship, but a second hit the Shannon's nets. No. 45's torpedo, fired at the Northampton, struck that ship's net and glanced off forward, running alongside the net and finishing its run close to it under the port bow. By General Rule No. 21, to be considered disabled by a torpedo, a ship had to be actually struck by one. The claim against the ship was, accordingly, not confirmed; whilst that preferred as regards the boats, that they had been put out of action, was adjudged to have been made good. These attacks practically closed the St. George's Channel manœuvres, which ended formally at noon on Thursday, 30th of July.

Catchers best means of defence against torpedo-boats.

"As far as instruction for guidance in real war can be derived from the operations of peace manœuvres, the following deductions from those of 1891 in the St. George's Channel appear tenable. The employment of a distinct force of so-called 'catchers,' to act offensively against torpedo-boats, promises to hamper the action of the boats seriously. It may oblige the torpedo-boats, whose *raison d'être* is to attack, to take precautions for their own defence, both when starting from their stations for, and when on their way back to them

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from, an expedition. In other words, it imposes upon them the necessity of performing two functions in the place of one. Rear-Admiral Erskine, speaking of the first expedition of the Blue Squadron against the ships in Milford Haven on the particularly light night of the 22nd–23rd of July, remarks that there was 'no chance of eluding the catchers,' and that 'nothing remained for the boats but to retreat before the swifter foe, only to encounter on their return voyage more catchers off Tuskar Rocks.' The number of vessels specially detached by Captain * Long as catchers to operate offensively against the twenty torpedo-boats of the other side was as large as the force at his disposal allowed. Probably this is a much smaller proportion than it would be found necessary to employ in real war. The manner in which the torpedo-boats have been handled during the last and previous manœuvres proves that service in 'catching' would be eminently suitable to young British naval officers.

Mode of attack by torpedo-boats.

"In the attacks made upon the Red Squadron whilst under way, it may have been observed that the torpedo-boats more than once came up astern or on the quarters of the ships assailed, and thereby gave the latter an advantage. The reports from the boats make it evident that the mode of attack accepted in principle was to be from ahead. This is clear from two separate papers, describing the method to be followed, by Lieutenant Sturdee and Lieutenant Bairnsfather. The reason why there was a difference between the plan of attack as originally formulated and as carried out, is to be found most likely in the difficulty experienced at night in making certain in what direction relatively to her you are approaching a ship—the lights of which have been put out, or are so masked that they cease to be a guide. This of itself affords some amount of protection, though of a negative character only, to ships navigating torpedo-boat infested waters.

Season unfavourable for torpedo-boats.

"The manœuvre hostilities began one day after a full moon and lasted only eight days in the height of the summer—of summer such as it was in 1891. The brilliant moonlight was against the torpedo-boats, but on the other hand it facilitated their discovery of their enemy, whose strategy comprised clandestine movements from an anchorage, where he had been reported to be, to another unknown to his opponent. Captain Long, when remarking that the weather was singularly fine and the sea smooth, considered it 'a circumstance favourable to the torpedo-boats.' One condition was unquestionably unfavourable to the torpedo-boats, and was accompanied by scarcely any corresponding advantage. There were about eighteen hours' daylight in every twenty-four; so that the interval during which a

* Now Rear-Admiral.

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torpedo-boat could act with a fair prospect of success was short, whilst that during which she was exposed to risk of attack was three times as long. This condition is inseparably connected with summer manœuvres in these latitudes.

Captain Durnford on night attacks.

"Though the advantages of assuming the offensive against torpedo-boats, instead of relying upon merely passive or local defences, have been proved, perhaps, by these manœuvres, it is of importance that deductions concerning the value of the boats should not be carried too far. Captain Durnford is of opinion that, as regards a night torpedo-boat attack, 'the accuracy of the fire of guns is a question that has to be considered,' and—taking account of the usual night-firing practice and 'the extraordinary way people think they see torpedo-boats when none are there'—he thinks that 'the boat has an excellent chance of not being hit.' He makes further remarks which may well be considered when estimating the value of the torpedo-boat as an engine of war. 'The accuracy of gun-fire depends upon the distance being known to give the guns the required elevation. The accuracy of torpedoes does not depend on this; and in war, with new torpedoes of high speed, I believe the results will be better than we obtain in peace with old torpedoes now getting worn and shaky.' The general result of the St. George's Channel operations gives no encouragement to the view that precautions against torpedo-boat attack may be relaxed in any way. On the contrary, it tends to show that additional precautions, such as acting on the offensive, are necessary.

Difficulty in framing rules.

"A code of rules forms an indispensable part of a manœuvre programme, and compliance with the provisions of the code as declared by the umpires must be compulsory on all parties. It has not been found possible as yet—perhaps it never will be found possible—to make rules which will exactly conform to the conditions of real warfare; consequently, a manœuvre proceeding judged in strict accordance with the most carefully devised rules might have turned out differently had the war been real and not simulated. Rear-Admiral Erskine has made some remarks upon this subject which it is desirable to reproduce here almost in full:—

Admiral Erskine on torpedo-boat operations.

"He says—'Torpedo-boat operations in time of peace are those of all others which it is least possible to assimilate to those which would occur in actual warfare. I think it is generally conceded that a torpedo attack to be successful must be in the nature of a surprise; the question, therefore, as far as these peace manœuvres are concerned, whether the battleships of the Red Squadron have been surprised, and whether in consequence the attacks of the boats have

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been successful, has been answered by the verdict of the umpires. I think it has been shown that on several occasions, both at sea and in harbour, the boats have been able to elude the catchers, and to approach the fleet without being seen, the surprise being complete. I allude to the cases where the battleships were encountered at sea, and (taking the conditions as they would have been in war) I think it is fair to assume that the result would have been the total destruction of the ships, and that the attacking boat would have come out of the action, in those instances, comparatively unscathed. I claim for the Blue Squadron that they have effectively and successfully carried out the objects of the operations. The boats have been in constant touch with the enemy's ships, the movements of the Red Squadron have been watched and detected, and they have been continually and persistently harassed. On two successive nights in Luce Bay the boats, even in a clear and moonlight night, have managed to evade the catchers and to creep within striking distance of the battleships. No. 42, the slowest boat in the flotilla, whose speed was reduced to a maximum of thirteen knots, was enabled to deliver a right and left blow with her torpedoes against the battleships in Luce Bay, and that she would certainly have escaped capture had not the delay in picking up her torpedoes taken place, and had she not therefore fallen into the hands of a catcher on return voyage in broad daylight.' "

Chief lesson to be drawn from St. George's Channel operations.

These operations may be regarded as mainly a development of those which took place during the manœuvres of 1890. It was then shown experimentally that the radius of offensive action open to torpedo-boats skilfully and boldly handled was much wider than had generally been assumed, and it was made clear that much might be gained by "assuming the offensive against torpedo-boats, instead of relying upon merely passive or local defences." That proposition may now be regarded as experimentally verified. It would be unwise, however, to lay too much stress on the actual results obtained so far as they are unfavourable to the attack, because it is almost inevitable that the rules laid down for the conduct of torpedo manœuvres should be unduly favourable to the defenders. The torpedo-boat scores no success unless her torpedo is actually discharged and actually hits the ship assailed, whereas she is ruled out of action if the ship assailed merely fires blank cartridge in any and every direction for a short time immediately prior to the actual discharge of the torpedo. We must look to broad isssues, therefore, and not to isolated and individual results, in judging of torpedo operations. Admiral Long undoubtedly furnished a pregnant illustration of the right mode of meeting the

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attack of a naval Power whose position, strategical and territorial, requires or induces it to rely largely on the torpedo-boat as a primary weapon of naval offence. England can never be such a Power unless she is content to resign the strategic command of the sea, and with it the security of her Empire and her maritime commerce. It is therefore far more important for England to study exhaustively the best mode and means of defence against torpedo-boat attack than to lay stress in her general naval policy on the torpedo-boat as a primary weapon of offence. It is always doubtful policy to measure the naval requirements of England by the provision which other naval Powers, differently situated, think it expedient to make for their maritime security. Least of all is the number of torpedo-boats required by England to be determined by the number which other Powers possess. We cannot fight torpedo-boats with torpedo-boats. If we were at war with a Power able from its position to attack our coasts, our commerce, and our fleets in home waters with torpedo-boats, what we should require to meet such an attack would be not torpedo-boats, but "catchers." The manœuvres in St. George's Channel appear to have shown that, due allowance being made for the chances of war, which in the long run may be expected to affect both sides indifferently, a sufficiency of "catchers," handled as English naval officers may always be expected to handle them, is an adequate defence against the attacks of torpedo-boats. They may further be held to have shown that we have at present no such sufficiency of "catchers" as would undoubtedly be required to clear the narrow seas of torpedo-boats in the event of a war with our nearest Continental neighbour.

J. R. THURSFIELD.

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CHAPTER IV.

Foreign Manœuvres.

France.

The French Manœuvres of 1891 were organised on a scale of unprecedented magnitude, more than a hundred vessels—of which forty were ironclads and cruisers—having been fitted out and manned for the purpose in the naval ports of the Atlantic and the Mediterranean. No less than 3700 men belonging to the two classes of the French Naval Reserve were called out, and this was the first occasion on which the reserves called out completed their period of twenty-eight days' training at sea. In describing and commenting on the manœuvres in their twofold aspect of mobilisation and evolution copious use will be made of a very instructive article which appeared in the *Revue des Deux Mondes* for September 1, 1891, and was subsequently reproduced in the pages of the *United Service Magazine* for December 1891 and January 1892, in the form of a translation, executed with the permission of the writer, by Commander D. Crofton, R.N.

Mobilisation.

Inscription Maritime.

Volunteers.

The French Navy is manned from two sources: (1) the Inscription Maritime, an institution two centuries old, which has so far survived all political changes in France, and (2) the volunteers, chiefly consisting of skilled artificers in the engine-room and torpedo departments, who are allowed to volunteer for service in the Navy in substitution for the required period of military service which every French citizen has to undergo. The Inscription Maritime includes the whole maritime population of France, whose period of service, actual and contingent, extends from the age of eighteen to that of fifty. The period of compulsory service in time of peace is seven years, five of which must be active service afloat; at the end of this period the men pass into the reserve, and can only be called out by a decree of mobilisation. The men belonging to the Inscription Maritime enjoy a monopoly of the coasting trade and the fisheries of France, and at the end of twenty-five years' service, either in the Navy, or, subject to the conditions of the

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Inscription, in the sea-going mercantile marine, they receive a pension provided by means of a system of deferred pay. The total number of men thus available for the naval service of France is about 118,000; but of these a large proportion are employed in the mercantile marine, so that it is probable that, when all proper deductions are made, not more than 30,000 men would be immediately available as a reserve for naval purposes in case of an emergency. The active peace complement of the French Navy is about 35,000 men, and of these 20,000 are supplied by the Inscription Maritime. The remaining 15,000 are the volunteers engaged for periods of from five to nine years of active service, derived from the inland non-maritime population, and employed for the most part in those skilled services on board a modern warship for which the purely maritime antecedents of the members of the Inscription Maritime are an insufficient qualification—such services as are discharged by artificers, gunners, torpedo-gunners and artificers, accountants, and the like. At the end of their engagement, whether for the longer period or the shorter, the volunteers complete a period of ten years' service—as an equivalent for the ten years of military service obligatory on all Frenchmen—in the naval reserve, and are liable to be called out for twenty-eight days' naval service on the same conditions as the military reserves. At the end of ten years their connection with the Navy ceases, and they are passed into the territorial army.

Of these two classes of the reserve some 3700 men were called out for a period of twenty-eight days' training, to begin on June 22. Those belonging to the maritime *arrondissements* of Cherbourg and Brest were summoned to those ports and embarked on certain ships of the reserve fitted out for the purpose. No strategical evolutions were assigned to the ships mobilised in the northern ports. The vessels employed were, at Cherbourg, the sea-going ironclad Turenne, the coast-defence ironclads Vengeur, Tonnerre, and Tonnant, the armoured gunboat Cocyte, the first-class cruiser Duguay-Trouin, the second-class cruiser Fabert, the torpedo cruiser Épervier, and fourteen torpedo-boats; at Brest, the coast-defence ironclads Fulminant and Tempête, the first-class cruisers Nielly and Forfait, the second-class cruiser Éclaireur, and nine torpedo-boats. These ships were sent separately to sea, and were engaged for the required period of twenty-eight days in the training and instruction of the reserves called out to form their crews.

Ships mobilised at Brest and Cherbourg.

Mediterranean Squadron.

On the other hand, the reserves belonging to the maritime *arrondissements* of Lorient, Rochefort, and Toulon were assembled to

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the number of 1300 at Toulon, for the purpose of completing the sea-going complements of the ships forming the permanent Mediterranean Squadron, and of furnishing crews to other ships, mobilised with a view to the temporary reinforcement of the squadron during the period of manœuvres. The permanent Mediterranean Squadron is composed of three divisions, each containing three sea-going battleships, together with a variable number of cruisers of the first rank, of torpedo cruisers, torpedo despatch-boats (*aviso-torpilleurs*), and sea-going torpedo-boats. The crews of the first two divisions only are maintained at their full strength. The ships of the third division and the cruisers of the first rank carry reduced crews, being in each case about 100 men short of their full complement of strength. Besides this, a reserve division of three battleships and three cruisers is attached to the squadron, the ships composing it being kept manned to the extent of two-thirds of their full complement. On their arrival at Toulon the reserve men were told off successively to make up the complements, first of the third division and of the cruisers permanently attached to the squadron, and afterwards of the reserve division. The residue, consisting of the latest arrivals, were embarked on the following ships mobilised for the temporary reinforcement of the squadron:—the battleship Caïman, the armoured gunboats Achéron, Fusée, and Mitraille, the cruisers Lapérouse, Dupetit-Thouars, Davout, Condor, Desaix, the torpedo gun-boats Bombe and Couleuvrine, together with thirty-five torpedo-boats.

Ships mobilised.

By 11 A.M. on June 23, the three divisions of the squadron were ready, and on receipt of an order from Paris Admiral Duperré put to sea with a force composed as follows:—

First division: Formidable, Courbet, Dévastation.

Second division: Hoche, Amiral Baudin, Redoutable.

Third division: Vauban, Duguesclin, Bayard.

Cruisers: Cécille, Tage, Lalande, Vautour.

Torpedo despatch-boats: Dragonne, Dague, together with nine sea-going torpedo-boats.

Leaving the Cécille with a division of torpedo-boats to guard the coasts during the embarkation of the reserve men on board the ships of the reserve division, the squadron proceeded to search for a supposed enemy, anchoring off Marseilles on the evening of the 24th, and detaching the third division to a post of observation off Cette. On the 24th the reserve division also put to sea, and proceeded to cruise between Toulon and Marseilles, while the armoured gunboats and the torpedo-boats of the mobile defence took up their appointed stations for the protection of the coasts. Thus, in twenty-four hours

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after the issue of the order for mobilisation the Mediterranean Squadron was at sea, and in forty-eight hours the mobile defence of the Mediterranean littoral was in working order, and supported by twelve ironclads fully equipped, manned and armed, and ready for an immediate action. This rapidity of mobilisation and equipment is sufficiently remarkable and not without significance for English naval readers. It is not easy to ascertain how far the date and extent of the mobilisation contemplated were anticipated by the French dockyard authorities; but, to judge from our own experience on similar occasions, it is probable that they were not without an inkling of what was about to happen. In our own dockyards ships have been mobilised and sent to sea with an expedition very little inferior to that of the French Mediterranean Squadron; and even if the superior rapidity displayed by the French is allowed its full value, it is nevertheless largely discounted by the fact that, of the nine battleships sent to sea in twenty-four hours, two-thirds are permanently maintained at their full effective strength, while the remainder were already in commission with crews only 100 men short of their full complements. The ships of the reserve division, moreover, which required forty-eight hours to prepare for sea, were also in commission and manned to the extent of two-thirds of their complements, while the newly mobilised ships had not all joined the flag of Admiral Duperré until the 28th June, six days after the issue of the order calling out the reserves. In the case of our own manœuvres of last year the order for mobilisation was issued on July 7. On July 8 the Sans Pareil and several cruisers subsequently attached to the Northern Fleet were commissioned, and by the 10th they were all at sea; on the 13th they had all joined the flag of Vice-Admiral Sir Michael Culme-Seymour at his anchorage in the Downs, having spent the interval at sea, and on the morning of the 15th the whole fleet weighed anchor and left the Downs for the North Sea, engaging forthwith in combined evolutionary exercises. Except that possibly the issue of the order for mobilisation may have more of the character of a sudden and unexpected surprise in France than it has in England, there is manifestly not much to choose between the performances of the two navies in respect of rapidity of mobilisation; indeed, when all things are considered, the real advantage would seem to belong to this country.

Manœuvres proper.

On the morning of the 25th of June the three divisions of the French Mediterranean Squadron anchored at the Salins d'Hyères, where the fleet was successively joined by the newly mobilised

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ships as rapidly as they could be sent to sea. From that date until July 4th the squadron was engaged in the ordinary exercises of drill and training, such as general quarters, manning and arming ship, by night as well as by day, weighing anchor frequently and proceeding to sea for the purpose of target and torpedo practice, scouting evolutions, torpedo attacks, and so forth.

Composition of squadrons.

On the 4th and 5th the squadron completed with water and coal, and on the 6th it put to sea, dividing itself in the evening into two squadrons, designated A and B respectively, and composed and commanded as follows:—

Squadron A, commanded by Admiral Dorlodot des Essarts, consisted of the following seventeen vessels:—

Battleships: Hoche, Dévastation, Formidable, Amiral Baudin, Redoutable.

Cruisers and lighter craft: Cécille, Lapérouse, Lalande, Vautour, Condor, Dragonne, Bombe.

Torpedo-boats: Audacieux, No. 126, Capitaine Cuny, Doudart de Lagrée, No. 127.

Squadron B, commanded by Admiral Puech, consisted of the following twenty-four vessels:—

Battleships: Courbet, Trident, Indomptable, Terrible, Caïman, Vauban, Duguesclin, Bayard.

Cruisers and lighter craft: Tage, Sfax, Dupetit-Thouars, Forbin, Faucon, Dague, Couleuvrine.

Torpedo-boats: Balny, Ouragan, Challier, No. 68, No. 151, Agile, Capitaine Mehl, Déroulède.

Mobilisation in England and France compared.

A comparison of this list with the one previously given will show that, the Caïman having been previously mentioned as a mobilised ship, the fourth or reserve division of the Mediterranean Squadron proper consisted of the Trident, Indomptable, and Terrible, so that the Caïman was the only newly-mobilised and newly-commissioned battleship attached to the Mediterranean Squadrons of evolution. All the cruisers and lighter craft, however, except the Cécille, Tage, Lalande, Vautour, Dragonne, Dague, and nine sea-going torpedo-boats, appear to have been specially mobilised. Here, again, a contrast with our own practice may be noted. The Admiralty never hesitates to send newly-commissioned and newly-mobilised ships to take part in organised fleet evolutions. The Nile was commissioned on June 30 and the Sans Pareil on July 8, and both for the first time; yet it

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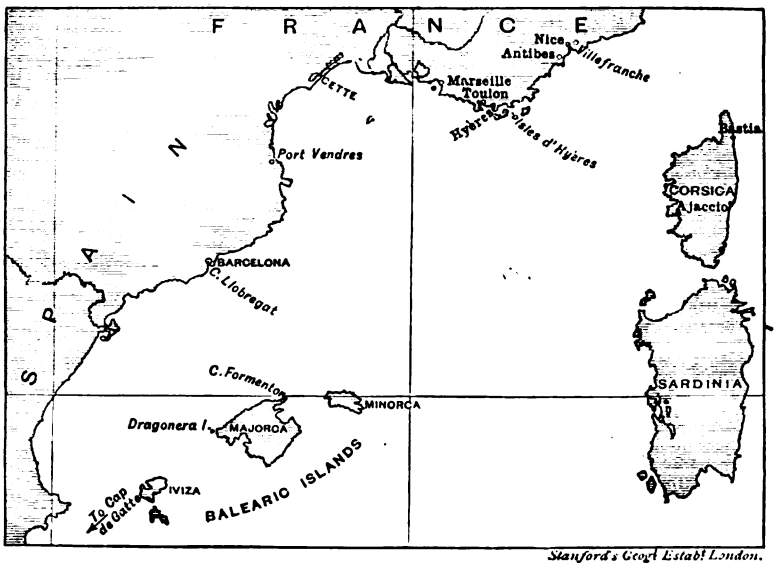
was thought nothing extraordinary when they were attached to the Northern Fleet by July 13. From the outset their performances in the matter of fleet evolutions were scarcely distinguishable from those of the permanently commissioned ships belonging to the Channel Squadron, and were certainly not inferior to those of the Conqueror and Hero, which, being permanent tenders to the gunnery ships Cambridge and Excellent, were in a condition of partial preparation when the order for mobilisation was issued, and may therefore be regarded as belonging to a category similar to the reserve division of the French Mediterranean Squadron.



Scheme of operations.

The scheme of operations which the two Squadrons A and B were required to carry out was officially formulated as follows:—

A Squadron A coming from Gibraltar steers to pass between the Balearic Islands and the Spanish mainland, its object being to operate against the coasts of France or of Corsica.

A Squadron B, which is cruising for the purpose of covering the French coasts, is informed by telegraph that Squadron A has doubled Cap de Gatte. Squadron B accordingly proceeds to intercept A for the purpose of opposing the passage of the latter through the channel between Majorca and Barcelona.

Squadron A has the advantage of speed, Squadron B that of numbers and of relative strength.

If the ships of Squadron A succeed in reaching the coasts of

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France or of Corsica, they must remain before the points attacked for six hours at least, three of which must be in daylight, and be for the whole of that time in superior force to the maritime and land forces opposed to them, as a condition of their attack being adjudged successful.

For this purpose a numerical coefficient of military strength is assigned to the land defences of the following ports:—Toulon, Marseilles, Villefranche, Nice, Ajaccio, Port-Vendres, Cette, Antibes, Bastia. Other ports are not to be considered as defended.

The coefficient of land defence assigned to any port is to be added to the coefficients assigned to any ships taking part in the defence; the sum of the two compared with the sum of the coefficients of the ships taking part in the attack will determine the superiority or inferiority of the defence, as the case may be.

The roadstead of the Isles d'Hyères is to be neutralised. Hostilities will cease at midnight between the 10th and 11th July.

Dispositions of Admiral Puech.

Time being allowed for the two squadrons to separate, and for each to take up such strategical position as seemed best to its commander in accordance with the foregoing scheme of operations, it was not until the evening of July 8 that Admiral Puech, in command of Squadron B, placed his ships in position across the channel to be guarded. The distance between the headland of Llobregat on the coast of Spain, south of Barcelona, and Cape Formentor, the north-eastern extremity of Majorca, is about ninety-five miles, rather less than the distance between the Lizard and Ushant, at the entrance to the English Channel. A line drawn from one point to the other bears S. 31 deg. E., N. 31 deg. W. Along this line, leaving an interval of thirty miles from the land at either extremity, Puech's battleships cruised in line ahead backwards and forwards, so that the whole distance from one extremity to the other could be covered in five hours at seven knots speed, and, of course, in less time at such higher speed as the squadron might be able to maintain. The third and fourth light divisions were disposed ahead and astern of the squadron, the third light division, composed of the Faucon and Dague to the S.W. (so says the *Revue des Deux Mondes*, but possibly the S.E. is meant), and the fourth light division, composed of the Dupetit-Thouars, torpedo-boat No. 151, and the Balny, to the N.W. At fifteen miles to the westward of the cruising ground of the battleships the first and second light divisions were posted, and ordered to cruise on a line parallel to that of the battleships; the first light division, consisting of the Tage and Forbin, ranging from the coast of Majorca to an offing of twenty-five miles, and the second light division, consisting of

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the Sfax and Couleuvrine, having a corresponding range from the coast of the Spanish mainland. Throughout the night, which was dark, stormy, and squally, these stations and positions were very well kept, although no lights were shown.

Compared with Sir G. Tryon's.

It is interesting and not uninstructive to compare the dispositions made by Admiral Puech with those made in somewhat similar circumstances by Sir George Tryon in 1889, when required to guard the Channel against an anticipated attack by a hostile squadron acting under the orders of Admiral Baird, and starting from the south coast of Ireland. Puech's task was obviously the easier of the two. He knew, in the first place, from the conditions of time involved, that des Essarts must attempt to force the passage during the night of July 8th, and that in doing so he must cross the line on which his own squadron was established. Tryon, on the other hand, knew neither the place at which, nor the direction from which, his adversary's attack would be made. Nevertheless, he did not hesitate to dispose his ships across the Channel between Falmouth and Ushant in the widest order consistent with immediate communication from one ship to another, trusting to be able to concentrate, in the event of an attack, in force on any point of his extended line. The result was that Baird's attack was completely foiled, three of the six ships composing his squadron of attack being captured, while the rest were forced back to Queenstown. The dispositions of Admiral Puech, if equally skilful and equally well adapted to the conditions of the case, were certainly not equally fortunate in the result.

Squadron A slips past Squadron B.

Squadron A, advancing in line ahead, doubled the island of Dragonera off the west coast of Majorca at 11 P.M., and then proceeded along the northern coast of the island, keeping close to the shore; its first light division was advanced to a suitable distance ahead, for the purpose of scouting in the entrance to the Balearic Channel, and ascertaining whether Squadron B had stationed any lookout ships in that direction. At 2 A.M. on the 9th, the Doudart de Lagrée and two other torpedo-boats burnt blue lights to signify that they could not keep up with the squadron, thus compelling the main body of the squadron to reduce its speed, and at the same time indicating its whereabouts to the Tage and Forbin cruising in the offing. Leaving the Forbin to observe the movements of the enemy, the Tage went to convey the intelligence to Puech, who was found at the south-eastern extremity of his cruising line. Puech immediately altered course to N. 70 deg. E., so as to cut off Squadron A if it should make for the coast of Provence. There was now a fresh breeze and a sea suf-

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ficiently rough to make it impossible for the torpedo-boats to keep up with the battleships. The torpedo-boats of Squadron B were accordingly ordered to act independently, under the convoy of the Dupetit-Thouars, while those of Squadron A, convoyed by the Condor, were sent under the shelter of the land—a significant commentary on the policy, little favoured by British naval authorities, of sending torpedo-boats to sea with a cruising fleet of battleships. At 4 A.M. Squadron A was abreast of the north-east point of Majorca, and steering for the coast of Minorca, its light divisions having now been recalled and placed on the flanks of the battleships, so as to offer less chance of discovery by Squadron B. Up to 3.45 A.M. the Forbin managed to keep touch with the squadron she had been left to observe, but at that time, when it appeared to be steering a course N. 70 deg. E., she lost sight of it.

Admiral Puech pursues.

Meanwhile Admiral Puech, having despatched the Dague to order his second light division to rejoin, sent the Tage on ahead to try and recover touch with Squadron A. The Tage proceeded as far as twelve miles to the north of Minorca, and returning at 8.15 signalled to the Trident, Admiral Puech's flag-ship, that she had seen nothing of the enemy, and could not believe that since two in the morning he had passed to the north of Minorca. Puech, however, again ordered the Tage to chase to the eastward, and at 3.50 P.M. the cruiser, now partially disabled by an accident to her port engine which compelled her to steam with a single screw, once more returned and signalled to the Trident that Squadron A was twenty-six miles off, bearing S. 50 deg. E. The Tage had sighted the squadron at a distance of sixteen miles, and had also been sighted by the latter. Accordingly Admiral des Essarts, recognising that he had remained under his adversary's observation up to 7 P.M., decided to make for Ajaccio, relying upon his superior speed to reduce the place before Squadron B could be in a position to relieve it. The latter squadron had been observed hull down astern as late as 7 P.M., and as three of B's cruisers were not visible, it was assumed that they were still further astern, as in fact they were, for though the Dague had been despatched to recall them, they had not yet rejoined the flag. Puech, in fact, was in great difficulty with his cruisers, great and small; three, the Sfax, the Couleuvrine, and Dague, were astern and out of sight; the weather had rendered his torpedo-boats incapable of acting on the offensive; the Tage, which had done excellent service during the day, was partially disabled; and the boilers of the Forbin and Faucon were giving no little trouble. Puech was accordingly unable to follow the enemy closely, or to attempt a

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surprise on his cruisers during the night, and, assuming that Squadron A was making for Ajaccio, he merely kept his course for that port throughout the night.

Attack on Ajaccio.

At 3.15 on the morning of the 10th the Tage, scouting ahead of Squadron B, reported that she had sighted some of the cruisers of Squadron A, and shortly afterwards she reported that the battleships were also in sight. Admiral des Essarts had, in fact, opened fire on the batteries of Ajaccio at 4.50, leaving the Cécille and Lalande outside the bay to look out for the approach of Squadron B. At 5.30 the Cécille signalled that Squadron B was in sight, and at 5.50 Squadron A abandoned the attack on Ajaccio, and retired at full speed to the northward, leaving the Lapérouse, which had fallen astern during the night, in the hands of the enemy. The Condor and the torpedo-boats belonging to A not being observed by B, the Courbet and Forbin were detached by the latter to search for them along the coasts of Corsica, apparently without success. At 3 P.M. the torpedo-boats of Squadron B, having been revictualled in the meanwhile, were despatched by Puech in chase of Squadron A, with orders to attack during the night. The period of hostilities was now ending, however; no time was left for Des Essarts to attempt an attack on the coasts of Provence, and he contented himself with altering course frequently during the earlier part of the night so as to baffle the pursuit, and frustrate the attack of Puech's torpedo-boats. At midnight the hostilities ended, and both squadrons returned in the morning to the anchorage at the Salins d'Hyères.

Conclusions of the *Revue des Deux Mondes*.

"Comme on le voit," says the writer in the *Revue des Deux Mondes*, "les conditions de la défense étaient assez défavorables; elles le seront toujours pour toute escadre ayant à couvrir un large détroit, en évitant de se disperser pour ne jamais être surprise en forces inférieures. Le mauvais temps et l'absence de lune ont encore ajouté aux difficultés qu'avait à vaincre l'amiral Puech. Celui-ci a cependant eu connaissance du passage de l'escadre A et a conservé le contact de son adversaire, et cela grâce au Tage, et aussi longtemps que ce croiseur a pu développer une vitesse de 18 nœuds. C'est une confirmation éclatante de l'importance du rôle que joueraient les croiseurs dans une guerre navale, quelle qu'elle fût." The last remark is indisputable, and its significance is emphasised by the writer when, in a subsequent passage, he sums up the number of cruisers on which the French Navy can rely for scouting at the speed required in the operations of modern fleets: "Deux croiseurs" (the context shows that the Cécille and the Tage are here meant), "plus le Davout, l'Alger, et le Jean Bart, en essais voilà tout ce que possède actuelle-

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ment la marine française pour éclairer ses flottes cuirassées.". It is manifest that Admiral Puech was grievously hampered by the lack of cruisers qualified to scout at high speed; but it may perhaps be suggested that the disposition of his battleships was such as rather to enhance this disadvantage than otherwise. Of course, the actual speed of which his squadron was capable was the governing factor in the case, and it may very well be that the composition of his squadron was such as to make it appear imprudent for him to adopt an order so dispersed as to place the several units of his squadron at the extreme limits of certain and immediate communication with one another. Unless there were conclusive reasons for not adopting such an order as this—an order which does not necessarily expose a squadron which adopts it to any additional risk of surprise by superior force—the order actually adopted by Admiral Puech must be regarded as open to serious criticism. He was superior in strength and numbers, though not in speed, to his adversary. His main object was therefore to bring his enemy to an action, and not merely to ascertain his whereabouts and objective. It so happened that the information of A's advance reached him at the point of his cruising line nearest to the locality where A was discovered. The contrary might just as easily have happened, however, and in that case Des Essarts might very well have been able to give his adversary the go-by altogether. On the other hand, had his ships, fifteen in number, without reckoning torpedo-boats, been disposed at intervals of only five miles apart, each being required therefore to keep a look-out only over a circle with a radius of two and a half miles, seventy-five miles of the whole distance would have been so covered that no squadron could have passed through without being observed, while the intervals of about ten miles at either end might have been patrolled by torpedo-boats. Along such a line signals can in ordinary weather be transmitted almost as rapidly as between ships only a few cables apart, and each ship is sufficiently supported by her consorts to run no serious risk of being overwhelmed by superior numbers. There may have been, as has already been said, excellent and paramount reasons why such a disposition was not adopted by Admiral Puech; but in default of such reasons its advantages are sufficiently obvious. For the rest, the failure of Admiral des Essarts, in spite of the "conditions assez défavorables" which hampered his adversary, either to reach the coasts of Provence or to make good his attack on Ajaccio, is a striking illustration of a well-known principle of naval strategy, the principle of a "fleet in being," as it may be called in

Criticisms on Admiral Puech's dispositions.

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the language of a great naval commander, Torrington, the British admiral who commanded at the battle of Beachy Head. Torrington was confronted in the Channel by a superior French fleet under Tourville. His own policy would have been to observe the enemy closely without endeavouring to bring on a general action, in which defeat would have laid England open to invasion and probably have resulted in a restoration of the Stuarts. "For," he wrote, "whilst we observe the French, they cannot make any attempt either upon ships or shore without running a great hazard, and if we are beaten all is exposed to their mercy." But he was forced by superior orders from London to fight against serious odds, though he took care not to expose his fleet to a total defeat; and even after the battle he expressed himself in similar terms. "As it was," he wrote, "most men were in fear that the French would invade, but I was always of another opinion; for I always said, *that whilst we had a fleet in being, they would not dare to make an attempt.*" This, it is true, applies to invasion; but the principle of the "fleet in being" applies almost equally to all attacks on territory from the sea. Such attacks are exposed to "a great hazard" so long as a hostile naval force is left at hand and undefeated—so great a hazard, indeed, that history affords few examples of their being undertaken, and fewer still, perhaps none, of their succeeding. Puech was not able to dispute the passage of Des Essarts through the channel where he awaited his advance; he even experienced great difficulties through the failure of his cruisers in keeping on his track. But even in these "conditions assez défavorables" the "fleet in being" neutralised all Des Essarts' efforts to make good his attack. It absolutely barred him from advancing against the coasts of Provence, and it frustrated his attack on Ajaccio. A similar case occurred in our own manœuvres of 1887. Admiral Fremantle managed to slip past Admiral Hewett, who was guarding the Channel, but he was caught in the entrance to the Thames before he had time to try conclusions with the forts, and was forced to retire into the North Sea.

Lessons to be drawn.

Three lessons of great moment may thus be deduced from the results of the French Mediterranean Manœuvres of 1891: first, the vital importance of a sufficiency of fast and powerful cruisers to act as the eyes and ears of the admiral in command; secondly, the absolute inefficiency of torpedo-boats as auxiliaries to a sea-going ironclad squadron; and thirdly, the moral and material influence of a "fleet in being" in neutralising the efforts of an enemy in inferior force to act on a vigorous offensive. These lessons are specially full

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of instruction for ourselves. Our need of cruisers is far greater than that of any other naval Power, inasmuch as in time of war our fleets must at all hazards secure and maintain the command of the sea, and to do so our admirals must be supplied with certain and immediate information of the movements of the enemy. The principle of the "fleet in being" is, in fact, only a particular example and illustration of what is meant by the strategical command of the sea, and what it implies. It implies the power to keep the sea, and to carry on an active defence at such strategical points, however distant from our shores, as are determined, not by local considerations of passive defence, but by the movement, strength, and apparent designs of the enemy. It follows that torpedo-boats, which are demonstrably useless, and in most cases a source of anxiety as auxiliaries to a sea-going squadron, are less necessary to our system of naval defence than they are to a Power which, resigning the strategical command of the sea, or not being confident of its capacity to secure it, must prepare for a local and passive defence of its territorial waters. There are some who point with anxiety to the large numbers of torpedo-boats with which certain Powers are supplying themselves, and urge that this country should forthwith follow suit. They may be right or they may be wrong, and in such matters it is well that all sides should be heard. But if the foregoing views are sound, it would seem to follow that torpedo-boats, the immense value of which, within their proper sphere of action, no one will dispute, must form a subordinate weapon in the naval armoury of a Power which depends for its very existence on its capacity to take and to keep the strategical command of the sea.

Russia.

The Russian Manœuvres of 1891 were carried out on a large scale in the Gulf of Finland. The general plan of operations and the rules for their conduct were given in the *Cronstadt Messenger* of the $\frac{2}{14}$ August, and are here transcribed for comparison with similar information relating to our own fleets and manœuvres. The translation is the work of Major J. Wolfe Murray, R.A., who kindly allows it to be used for the purposes of the *Naval Annual.*

The general lines upon which the plan of the forthcoming naval manœuvres is based are as follows: A hostile squadron has gained possession of the Gulf of Riga, and occupied the Moon Sound. Basing himself upon the latter, the enemy endeavours to blockade the Gulf of Finland, to destroy the Finnish coasting trade, and to inflict all

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possible damage on the commercial ports from Sveaborg to Bjorkö. Knowing that a portion of the defender's vessels are in Sveaborg, the enemy endeavours to prevent their breaking out, and attacks the remaining vessels of the defence, which are dispersed over the Gulf of Finland, so as to prevent them joining the squadron already in Helsingfors. The defender has to protect the chief Finnish ports from Sveaborg to Bjorkö, and he endeavours to take advantage of a dispersion on the part of the attacking force by coming up with separate ships or parts of his squadron. At the same time the defender tries to break out of Helsingfors, and from the Shkhers, or Finnish fiords, with the view of reaching the Moon Sound and operating against the enemy's base. The final object of the defender

Stanford's Geog^l Estab^t London.

is the concentration of his forces at Sveaborg, so as to act against the enemy's rear.

The manœuvres will commence on the $\frac{6}{18}$ August,* on which date a portion of the defending force will be at Sveaborg, and the remainder will be in the Shkhers to the east as far as Bjorkö.

During the manœuvres this year, as last, especial attention will be directed to working out signals for the rapid recognition of friends, or detection of foes, and also to determine the distance from the base at which torpedo-boats may act independently.

The following conditions are laid down:—

(1.) By the $\frac{15}{27}$ August all the attacking squadron will be at the Moon Sound. Part of the defending squadron will be at Sveaborg, and part in the Shkhers to the east, at the discretion of the officer commanding.

* This is a little at variance with what is stated below.

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(2.) The seaward entrance and main channels into the Shkhers and Sveaborg are to be considered regularly mined, and the mine fields at Rotchensalm, in the channels leading to the Malie Pelengi and to Transund, are, moreover, defended by light guns.

Plans of the mine fields, both at these points and others, are to be drawn up by the officer commanding the defence and given to the umpire-in-chief.

(3.) Revel is supposed to be fortified and mined, and the attacker is debarred from using the roadstead. It is also supposed that a portion of the attacking squadron is off the Tolbukhin, blockading Cronstadt, so that the defender cannot approach Cronstadt nearer than the meridian of Vely Motala.

(4.) Parkalud and Hangut are also supposed to be fortified, and so cannot be used by the attacker.

(5.) The attacker cannot make use of telegraphic messages, but depends entirely for information on the observations of his vessels.

(6.) The defending squadron can use the telegraph system, and any look-out posts which may have been established.

(7.) The attacking vessels are to be coaled from the Moon Sound, for which purpose the Artelshtchik and Samoyede are attached to the squadron.

(8.) After the $\frac{8}{20}$ August,* any defending torpedo-boats which issue from the Shkhers may reckon that they have captured any trading vessel taking stores to the attacking fleet, provided such torpedo craft get sufficiently near to the traders to see and enter the name of the vessel in her (the torpedo craft's) log-book.

(9.) Any attacking vessels mining a passage must remain sufficiently long in position to mine the passage as though they were actually laying down the mines. Only the number of mines actually on board are to be reckoned available.

(10.) Buoys to be used to indicate mine fields.

(11.) The attacking squadron may send out scouts to discover the whereabouts of the defence.

(12.) Commanders of squadrons will draw up charts twice a day showing the position of the force opposed to them, as obtained from the information supplied to them.

Umpires (1) Vice-Admiral Stetsenkoff, chief,
(2) Rear-Admiral Makaroff, attacking force,
(3) Captain Wulff, defending,

and two officers attached to each of (2) and (3).

* See note, p. 74.

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Composition of squadrons.

The squadrons are as follows :—

Attack: Vice-Admiral Kaznakoff, with Imperator Nikolai I., Imperator Alexander II., Herzog Edinburgsky, Admiral Greig, Rynda, Nayezdnik, Vjestnik, Lieutenant Ilyn, Revel, Lakhta, Narva, Ekenäs, transports Artelshtchik and Samoyede.

Defence: Rear-Admiral Gerken, with the Admiral Spiridoff, Charodeika, Grozyashtchy, Skobeleff, Strjélok, Plastun, Snieg, Groza, Ersh, Vikhr, Burun, Abo, Borgo, Kotlin, Luga, and Sveaborg, eight torpedo-boats, and the Slavianka.

The following are the rules for the guidance of umpires :—

Rules for guidance of Umpires.

Combats between opposing vessels are only to be reckoned capable of producing serious results at distances not exceeding twelve cables. If the number of heavy guns on one side is double that on the other, the side which is inferior will be placed out of action after an hour's fighting, provided there are no circumstances attenuating the claim of the superior side. One hour and double the number of guns is the normal; deductions will be made *pro ratâ*. Every vessel will have a coefficient of strength based upon the number of guns carried, taking an 11-in. or 12-in. gun = 3, a 9-in. = 2, a 6-in. = 2, a 9-pr. = ½, and 47-mm. gun = ¼. If a vessel approaches within four miles of a fortress, or a torpedo-boat within one mile, and remains a quarter of an hour under fire, it is to be considered out of action. If a vessel approaches another vessel at anchor within three cables with the intention of ramming her, the vessel so approached is reckoned out of action. Vessels placed out of action remain so for twelve hours. The probabilities of success are multiplied by three in case of armoured versus an unarmoured vessel, and by two in case of an armoured versus half-armoured, or in case of a half-armoured versus unarmoured vessel. All guns must be properly laid, and the range correctly found. Intervals between rounds must be equal to those determined by practice to be necessary in firing guns with service charges and projectiles. A vessel is reckoned out of action if a torpedo-boat can approach within two cables without being fired at. Vessels with nets are out of action if two torpedo-boats can approach within the same distance simultaneously. A torpedo-boat is destroyed if it has been fired on, from a distance of seven cables, by one machine-gun for three minutes, two or three machine-guns for two minutes, and four or more guns for one minute. When a vessel is simultaneously attacked by several boats these times are to be increased by one minute. Torpedo-boats having made the number of discharges equivalent in number to the torpedoes they carry in their apparatus

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are to retire out of fire, to recharge their apparatus if they have spare torpedoes. To recharge will take not less than half an hour. A torpedo-boat is put out of action when (1) it is on the move and attacked by two torpedo-boats, (2) at anchor when attacked by a torpedo-boat in motion.

As regards submarine mining obstructions :—

(1.) If a vessel passes a line of submarine mining obstructions, without taking up the mines, it is destroyed.

(2.) When several vessels in column line ahead pass an obstruction without taking up the mines, the leading vessel is destroyed; and in narrow passages the two leading vessels.

(3.) A submarine mining obstruction is considered effective only if laid out in three rows with intervals between mines of not less than 100 ft.

(4.) Two boats sent out to clear a passage of mines must spend ten minutes in picking up each mine, and remain in the place where the mines are laid.

Account of operations.

The following account of the operations during the manœuvres is taken from an article in the German *Marine Rundschau*, a translation of which, by Commander Garbett, R.N., was printed, by permission, in the March number of the 'Journal of the Royal United Service Institution':—

Dispositions of attacking squadron.

"After the two squadrons had taken up their respective stations, the manœuvres immediately commenced, and lasted from the 16th to the 20th of August. The reports about the course of the operations and the performances of individual ships are not sufficiently in detail to allow us to trace out a perfect picture of all that took place, but they suffice for a general review. On the morning of the 16th, the attacking commander found himself with his whole force in the western portion of the Gulf of Finland. Of the ships told off for the squadron the Nikolai I. appears to have been withdrawn, as she is never mentioned. The commander-in-chief divided his ships into three squadrons: the first consisted of the armourclad Herzog Edinburgsky, the corvette Rynda, and the torpedo-boats Narva and Lakhta; the second of the armourclad Alexander II., the clipper Vjestnik, and the torpedo-boats Ekenäs and Revel; and the third of the armourclad Admiral Greig, the torpedo despatch-boat Lieutenant Ilyn, and the clipper Nayezdnik. The second division received orders to reconnoitre the fiords from Helsingfors to Aspö, and to ascertain the strength of the enemy in that part. While they steamed to perform this duty, the two other divisions proceeded eastward, keeping as far to the southward as possible. The Lieutenant

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Ilyn was despatched to thoroughly reconnoitre the fiords between Aspö and Bjorkö; the squadron, after passing Hogland Island, kept to the eastward of the island during the night, and remained there till morning with their lights masked. Early in the morning of the 17th the transport Artelshtchik joined the squadron, and with its help a landing brigade was conveyed to the northern point of the Hogland Island, and occupied the village there without meeting any resistance. Soon afterwards, the second division rejoined the flag, reporting that the fiords from Aspö to Helsingfors were apparently not occupied, while the enemy, as far as could be seen, had collected his force in the latter port. The commander of the squadron, Admiral Lazarew, therefore received orders to blockade Helsingfors with his force, and above all things prevent the defenders from breaking out to sea. After the second division had again parted, the Lieutenant Ilyn returned from reconnoitring, and reported that she had searched the Bjorkö Sound and the Great Roads of Trangsund without seeing anything of the enemy; she, therefore, considered it certain a division of the defending squadron was concentrated at Aspö. In order to ascertain this for certain, the admiral despatched the Rynda, accompanied by the torpedo-boat Narva, with orders to go to Aspö.

Dispositions of defending squadron.

"During these events, the defending commander also took his measures to carry out the duties assigned to him. He divided his force into several unequal divisions, and despatched them presumably within the fiords to those channels which lead to the more important coast towns. In Helsingfors there remained the armourclad Admiral Spiridoff, the armoured gunboat Grozyashtchy, the corvette Skobeleff, the gunboats Groza and Burun, as well as the first-class torpedo-boats Abo, Kotlin, and Sveaborg, and some second-class boats; the armoured gunboat Charodeika, the clippers Strjélok and Plastun, the gunboats Jersch and Vickr, the schooner Slavianka, the first-class torpedo-boats Borgo and Luga, as well as four second-class boats, were sent to Aspö, while the gunboat Snieg and a second-class torpedo-boat went to Trangsund. When the last-named vessels arrived at their post is not given, but they probably arrived almost immediately after the Lieutenant Ilyn, having made her reconnaissance, had again left.

Success of the Rynda.

"On the 17th, at 8 P.M., the torpedo-boat Narva returned from Aspö, and reported that five of the enemy's ships were off the roadstead, and that they had discovered the presence of the Strjélok, Plastun, Borgo, and Luga. The Rynda had been surprised and attacked by the two torpedo-boats, but the attack had failed, as the

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high sea running made it impossible for them to approach the corvette within range; she, on the other hand, had fired at the boats with her quick-firing guns, and, having kept them under fire the allotted time, both boats were put out of action. At the conclusion of the action the Rynda left for Bjorkö Sound. After she had searched for mines, but finding no enemies, she proceeded to the Great Roads of Trangsund. Here the gunboat Injeg and a second-class torpedo-boat were lying, and, after a short action, they were forced to succumb to the superior force of the Rynda.

Operations of the Grozyashtchy.

"While the attacking force had thus scored some successes, the defenders did not remain inactive, but were bestirring themselves to damage the enemy. A particularly smart blow was dealt the enemy by the gunboat Grozyashtchy. She succeeded, on the evening of the 17th, in breaking through the blockade maintained by the Alexander II., the Vjestnik, and two torpedo-boats, and escaped to sea. She must have slipped away quite unseen, else it is difficult to explain why she was not pursued. The Grozyashtchy next captured, in accordance with No. 8 of the Manœuvre Regulations, a number of transports belonging to the enemy, and then went on to the Moon Sound. Here she destroyed all the coal and provision depôts, laid out a number of mines, and returned, unattacked, to Helsingfors. By this operation the attacking fleet was robbed of its base, and was compelled to establish a new one.

Attack by defender's torpedo-boats.

"In the night of the 17th–18th, followed, on the side of the defenders, an attack by torpedo-boats on the enemy's squadron, which was lying at anchor off the northern point of Hogland Island; although they had guard-boats on the look-out, their torpedo-nets were, apparently, not out. When Rear-Admiral Walizki, who was lying at Aspö with a division of the defending squadron, learnt the position of the enemy, he despatched the three torpedo-boats Borgo, Luga, and Kotlin to the attack. About 9 P.M. the boats left the roadstead. The hitherto strong south-westerly wind had subsided somewhat, but the sea was still high. The torpedo-boats had to steam against wind and sea, so the Borgo, which was the fastest, drew ahead of the others; when she arrived off the northern point of Hogland she kept close under the land and proceeded along shore. About 10.50 P.M. she discovered the masts of the enemy's ships, which showed out against a tolerably clear horizon, and the boat, which had now approached towards the centre of the squadron, shaped its course for the most seaward of the ships, and steamed full speed towards her. After she had turned, she steamed alongside and gave some short whistles as a signal of the complete success of

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her attack; steering again to Hogland, she now received the first shot from the blown-up ship, which was the Admiral Greig, and immediately the whole squadron opened fire. The confusion was utilised by the Luga, which had now come up, to steer through the unilluminated part of the sea until she was close under the stern of the Herzog Edinburgsky and to discharge her torpedo at close quarters. Both torpedo-boats escaped after having made a most successful attack.

Further operations of attacking squadron.

"In view of the reconnaissance which had been made off Aspö, the attacking admiral determined to proceed there at full speed against the reported weak force of his opponents, and to cut them off from the squadron in Helsingfors. For this purpose, at daybreak on the 18th August the frigate Herzog Edinburgsky—although by the regulations she was out of action until mid-day—the cruiser Ilyn, and torpedo-boats Lakhta and Narva proceeded to Aspö, to prevent the defenders' ships from breaking out. After the mine-field had been cleared away at the entrance and the squadron was approaching the Luppi Beacon, the admiral observed that the three ships of the enemy, the gunboat Charodeika, the clippers Strjélok and Ptastun, were steaming full speed through the fiords to the west, apparently in order to join the main body of their fleet. In order to prevent this, Admiral Kasnakow signalled to the ironclad Admiral Greig, the clipper Nayezdnik, and the torpedo-boats Revel and Ekenäs to close, and, as soon as they had joined him, he steamed with his whole force in column in line ahead on a course parallel with the ships of the defenders. As the latter were inferior in speed and force to the attackers, Admiral Kasnakow pursued them for only as long as was necessary to put them out of action. However, it is not quite certain whether he succeeded in this, and it is not quite easy to make out what exactly did take place. During the artillery duel the Ilyn and four first-class torpedo-boats undertook an attack upon the enemy's ships; the torpedo-boats, however, failed in their part, and only the Ilyn was in a position to discharge two torpedoes at the Charodeika, but with what result is not known. When the action was ended, Admiral Kasnakow turned back and looked for the other portion of the defending force. At two different stations within the fiords were discovered the gunboat Vikhr with two first-class torpedo-boats, and further under the land the gunboat Jersch, schooner Slavianka, and two second-class torpedo-boats, which had all come out from Rotschensalm in order to rejoin the other ships of the detached squadron, under the orders of Admiral Walizki. Admiral Kasnakow directed the

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Ilyn to attack the Slavianka, while the clipper Nayezdnik and the torpedo-boats Lakhta and Narva dealt with the Vikhr.

"Both attacks failed, as the Slavianka managed to escape through the inner channels, while the Vikhr was fortunate enough to take up so favourable a position in the narrow channel Kitelsund, by the island of Sur-Musta, that she could not be reached. The Lakhta and Narva, in their attempts to take the gunboat in rear, were suddenly attacked by two second-class torpedo-boats, which had been lying completely concealed behind the nearest islands, and according to the rules they were put out of action, as they were at the same time subject to the fire from the quick-firing guns of the Vikhr. The Lakhta also, in manœuvring in the narrow channels, took the ground, but without sustaining any damage. The Vikhr, however, took advantage of the unfortunate position of the two attacking gunboats, and steaming out of the narrows with the two second-class boats she attacked the Nayezdnik and forced her to withdraw.

Failure of attack on Vikhr

"After the failure of the enemy's squadron in their attempts against the fiord-flotilla, the admiral re-anchored in the roadstead off Fort Slawa, and sent the torpedo-boats Ekenäs and Revel to join the division blockading Sveaborg. The night of the 18th–19th of August passed quietly, and the next morning the squadron weighed, and returned to its old anchorage off Hogland Island. Here also returned, in the course of the morning, the Ekenäs and Revel, which, having been repulsed in an attack upon the ironclad Spiridoff and the corvette Skobeleff, were placed out of action.

Attacking Squadron withdraws to Hogland.

"In this attack, which probably took place off Helsingfors, the torpedo-boats, however, succeeded in destroying the gunboat Groza, which, believing them to be friends, allowed them to approach without opening fire upon them.

"During the 19th of August the attacking squadron remained at its anchorage and completed with coal from the Samoyede and transport Artelshtchik.

Final operations.

"At 6 P.M. the ships weighed, and taking the channel south of Hogland, steamed in two columns to the westward. The defending squadron was so weakened by having to detach vessels to Aspö and Trangsund, that it was not in a position, without recalling these ships, to undertake the duty of threatening the enemy in rear. As the commander did not succeed in reuniting his ships at the proper time, nothing finally remained for him to do, except to give battle off the roadstead. When, therefore, at daybreak on the 20th of August, the attacking squadron hove in sight of the Grahara lighthouse, the

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ships of the defenders were observed to have left the roadstead of Helsingfors and to be standing to the eastward. A dense fog which set in prevented any operations during the forenoon, and concealed the movements of the opponents; when it again cleared, it was evident the defending commander wished to fight a decisive battle. After the armourclad Alexander II. and the clipper Vjestnik had rejoined the attacking force, the squadron formed line-of-battle in columns of divisions in line ahead, and advanced to the attack.

"At a distance of about three sea miles from the enemy, Admiral Kasnakow re-formed single column in line ahead, and opened fire at about 4000 yards (4000 m.) upon the enemy, who had adopted a similar formation. After both squadrons had maintained for an hour an ineffective cannonade, and were off the Sztina Shoal, the commander of the attacking squadron, about 5 P.M., ceased the action, and the manœuvres came to an end."

AUSTRIA.

Composition of Squadrons.

The Austrian Manœuvres of 1891 were carried out by two squadrons composed and commanded as follows: the attacking squadron, under Rear-Admiral Hinke, consisted of the armourclads Kronprinz Rudolf and Kronprinzessin Stephanie, the torpedo gunboats Trabant and Blitz, and the first-class torpedo-boats Kondor and Star; the defending squadron, under Rear-Admiral Rohrscheidt, consisted of the armourclad Prinz Eugen, assumed to represent a division of battleships, the cruisers Franz Josef and Tiger, sixteen torpedo-boats, and several small craft. The defending squadron was required to bar the entrance to Val Saldon, a spacious anchorage adjacent to Trau, and not far from Spalato on the Dalmatian coast, with field batteries, mines and booms, to establish signal stations on the islands in the offing, and to use this anchorage as a fortified base from which to operate against the movements of the enemy. The attacking squadron was assumed to represent the advanced squadron of an enemy in superior force. It was required in the first place to ascertain the strength and disposition of the defenders, and to reconnoitre the protected anchorage through the Narenta Channel, and subsequently, by means of a diversion against the flank of the defenders' position, to draw the latter away so as to leave the main force assumed to be following it free to invest the island of Lissa.

Reconnaissance of attacking Squadron.

Rear-Admiral Hinke left Gravosa on the morning of the 19th of June and shaped a course for Lissa. Some of his lighter craft detached for scouting purposes soon encountered the enemy's cruiser

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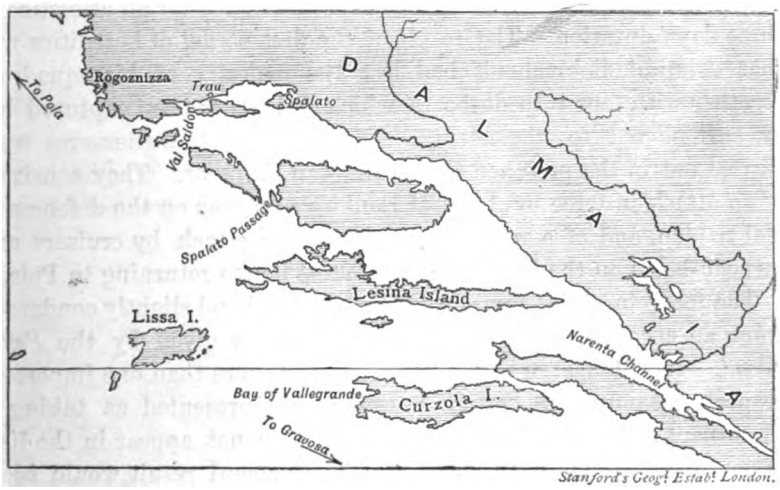
Leopard, which had been sent out for the purpose of observing his movements. In the evening he anchored off the island of Curzola, in the Bay of Vallegrande, protecting himself against torpedo attack by means of field batteries and a cruiser placed at the entrance of the bay. Rear-Admiral Rohrscheidt, having speedily obtained information from his detached cruiser of the approach of his assailant, and of his anchoring at Vallegrande, at once determined to send three of his torpedo-boats to attack him. The attack was made at three in the morning, and in spite of the skill and energy with which it was conducted, it was adjudged to have totally failed. At daybreak Admiral Hinke weighed anchor and proceeded to reconnoitre the Narenta Channel, being still observed by the Leopard. He accom-



plished his purpose and retired towards Lissa, but having doubled the eastern point of the lofty island of Lesina, he suddenly altered course and waited for the Leopard, which was still following him. The manœuvre was successful; the Leopard fell into the trap, and was unable to make her escape before she had been within range of the squadron for more than the period required to put her out of action. Admiral Hinke proceeded without further hindrance or observation to Lissa, where he anchored for the night, and where his adversary did not attempt to attack him, the speed of the Prinz Eugen, his only ironclad, not being sufficient to enable him to carry out any decisive operation in the time.

As a result of his reconnaissance, Admiral Hinke determined to assail his enemy's position through the narrow channel of Porte di **Admiral Hinke attacks.**

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Spalato. Having passed this on the morning of the 21st, he opened fire on the batteries surrounding the anchorage of Val Saldon. Upon this, Admiral Rohrscheidt at once weighed anchor with his whole force, and compelled his assailant to retire, but was unable to pursue him far owing to his lack of speed. Another engagement took place about the same time between the torpedo gunboat Blitz, belonging to Hinke's squadron, and the Komet and torpedo-boat Uhu, belonging to the defending force. The Komet was overmatched and unable to escape, owing to her failure of speed, which must have been due to a breakdown, as her nominal speed is equal to that of the Blitz, and is estimated at 22 knots; accordingly, having been under fire for a quarter of an hour, she was ruled out of action. On the following morning after Admiral Hinke had effected the required diversion against Rogoznizza, hostilities were suspended for an armistice of three days' duration. The result of the first period of hostilities was that Admiral Rohrscheidt had lost the majority of his squadron, together with four torpedo-boats, which had either been captured by, or surrendered to, the enemy. The subsequent manœuvres were carried out in the presence of the Austrian Emperor. They consisted of an attack in force by Admiral Hinke's squadron on the defences of Val Saldon, and of a well-concerted surprise attack by cruisers and torpedo-boats on the ironclad squadron as it was returning to Pola.

General criticism.

The foregoing brief summary is paraphrased and slightly condensed from an account of the Austrian Manœuvres given by the *Pester Lloyd*. It will be seen that it is defective in more than one important respect, inasmuch as certain vessels are represented as taking a prominent part in the manœuvres which do not appear in the lists given of the contending squadrons. The general result would seem to show either that the Austrian system of coast defence against maritime attack is imperfectly organised, or that the squadron required to act on the defensive was ill-adapted to the purpose. It is true that the Prinz Eugen, the only ironclad assigned to Admiral Rohrscheidt, was supposed to represent a squadron presumably superior in force to the two ironclads assigned to Admiral Hinke. But this superiority was neutralised by the slow speed of the Prinz Eugen. The torpedo attack on Hinke at his anchorage at Vallegrande, though it is said to have been skilfully conducted, would appear to have been ill-conceived. It was not of course Admiral Rohrscheidt's fault that he was compelled to make the attack at a period of full moon on one of the shortest nights of the whole year, and it may be that the distance of Vallegrande from his base made it impossible for him to deliver the attack before three in the morning. But a

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torpedo attack under such conditions could only be expected to succeed if the squadron assailed neglected the most ordinary precautions and exhibited the most culpable lack of vigilance. Indeed, it may well be conjectured that Admiral Rohrscheidt was of this opinion himself, and determined, in accordance with it, to sacrifice only three of his sixteen torpedo-boats in so desperate an enterprise. The capture of the Leopard by so simple a ruse as that adopted by Admiral Hinke would hardly seem to reflect much credit on the sagacity and vigilance of her commander. The manœuvres may be compared in many instructive respects with those assigned last year to our own Red and Blue Squadrons, and with the operations of the torpedo flotilla under Commander Barry in 1890; but for obvious reasons a detailed comparison of the results respectively attained would be unfair to the Austrian Navy.

GERMANY.

Of the German Manœuvres of 1891, the only accessible account is that given by the *Times* in an article printed on October 14. The article is here given in full, as any attempt to alter it materially would manifestly be unfair to the writer:—

A NIGHT ATTACK ON KIEL.

The German Naval Manœuvres have this year been conducted with much more secrecy than in 1890, and for this reason only have they been very little commented upon even in Germany. They have certainly been more instructive than they were last year, when, as those who read the accounts from our correspondents on the spot may recollect, they were not throughout of a very practical nature. This year, during the many weeks for which the operations continued, many interesting evolutions were carried out both in the North Sea and in the Baltic; but no operation seems to have attracted more notice from the chief officers engaged than the grand attack which, at the beginning of September, was made upon the seaward defences of the port of Kiel, and, by torpedo-boats, upon the warships in harbour. The attack, according to the evidence of a naval correspondent who witnessed it, is held to have demonstrated the impregnability of the haven when properly occupied. To admit this is, perhaps, to admit too much; for it may be doubted whether any system of marine defence can now withstand a prolonged and undisturbed assault from a strong and resourceful enemy; but it seems probable that the recent manœuvres did go far towards proving that

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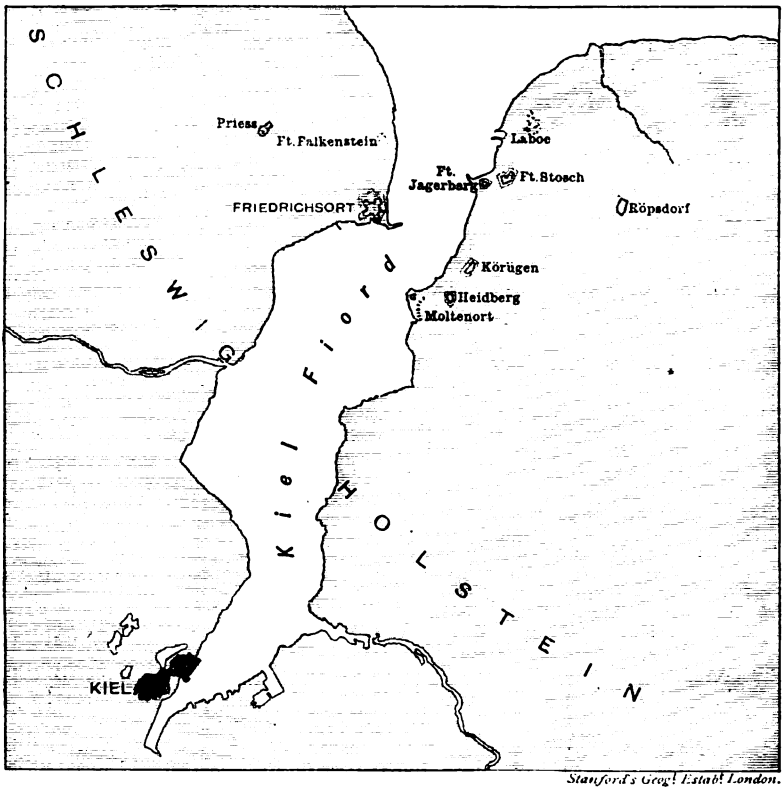
Kiel is safe from a *coup-de-main* from seaward, and, moreover, that warships lying in the port can be completely protected from raiding night attacks by hostile torpedo-boats.

Defences of Kiel.

Kiel lies at the head of a deep and narrow fiord, which runs in a south-south-westerly direction about ten miles into Schleswig-Holstein. Below Kiel, on the left or westward bank, rise in succession the strong, modern, and heavily-armed works of Friedrichsort, Falkenstein, and Priess, and, on the eastward bank, the works of



Stanford's Geog.l Estab.t London.

Moltenort, Heidberg, Korügen, Jagerberg, Stosch, and Röpsdorf. The defence was assisted by the Manœuvre Squadron, consisting of the ironclads Bayern, Baden, Oldenburg, and Siegfried, with the despatch vessel Zieten; and the attack was confided to the Evolution Squadron, consisting of older ironclads, accompanied by twenty torpedo vessels and boats, and reinforced by the gunvessels Bremse and Jagd. The attacking force was, of course, at sea, when, on the morning of the 3rd, hostilities were declared. The port was at once closed—

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that is, buoys, lights, and leading marks were supposed to have been removed, and no vessels were permitted to enter without pilots. All the forts were manned as if for actual war; the small port of Laboe, west of Röpsdorf, and close to the mouth of the fiord, was occupied by 300 men of the Marine Battalion; the neighbouring coast was lined with troops; a mine-field and some obstructions were laid down between Friedrichsort and Moltenort; a number of extra batteries were planted on both coasts, and a look-out station was established at the end of Laboe pier, and connected by telegraph with all the chief centres of the defence. All these preparations were made within a few hours, and without the slightest confusion. In the meantime, at an early hour in the morning, the Manœuvre Squadron, constituting the floating defence, had put to sea to endeavour to learn something of the motions of the enemy, leaving behind it in port only the training-ships Luise and Nixe. During the day nothing worthy of note occurred, and in the afternoon, as the weather was beginning to look dirty, and as a fleet could not wisely spend a dark night off the port in the known vicinity of a strong torpedo flotilla, the Manœuvre Squadron returned to its anchorage. At dusk, the weather having grown worse, and the wind blowing half a gale, electric search-lights from the shore were turned so as to illuminate the channel below Friedrichsort; and soon afterwards Prince Henry of Prussia, who, with his Princess, watched the whole of the proceedings, made a careful inspection of all the defences. It was nearly midnight when the approach of the foe was signalled by means of rockets from the direction of Laboe. The Evolution Squadron came within dangerous distance of the lower forts, and furiously engaged them for a short time, but soon disappeared again to the north-west. Some astonishment was expressed that no torpedo-boat attack had been made while the ships were thus occupying general attention; and an impression began to prevail that the weather had proved too bad for the small craft, and that they had taken shelter somewhere. Just before two o'clock the Evolution Squadron attacked again, more furiously even than before, and engaged not only Friedrichsort and the other forts in the narrows, but also the ships at anchor. Then, through the smoke, came at length the real attack by the torpedo flotilla, which, steaming at a speed of 20 knots, got within 1,200 yards before it was made out. A terrible fire was promptly opened upon it from everything that would bear, and it had no course but to turn about and make the best of its way back to the open. But it tried the experiment yet twice again, before it finally relinquished the hopeless contest.

Night attack on Kiel.

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Similar attack impossible in real warfare.

Such an attack would scarcely be made under corresponding conditions in real warfare. An admiral might try with his torpedo flotilla to catch his enemy asleep, as Commander Barry tried to catch Admiral Tryon last year at Plymouth; but he would carefully abstain from first rousing the defence by means of his battleships. Nor would he be justified in sending his torpedo flotilla at all up such a long, narrow, and powerfully-defended *cul-de-sac* as Kiel Fiord, unless he were pressed for time and deemed it of first-rate importance to make an immediate and desperate effort. But if, in similar adverse circumstances, any good could be effected by torpedo-boats, it could be effected by the German boats, which on this occasion were, as usual, handled to perfection. The flotilla is already as good as any in Europe, and, before the end of the current year, it will be increased by fifty new craft, thirty-two of which will have speeds varying from 24 to 26 knots, and displacements ranging from 110 to 145 tons, and all of which were ordered during the past year.

J. R. THURSFIELD.

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CHAPTER V.

Descriptions of some Ships Building or Completing.

Having in foregoing chapters described the policy and scope of naval construction in this and in foreign countries, we now have to refer more in detail to the ships which are in course of construction, or whose construction is proposed, of which descriptions have not already appeared in the pages of the *Naval Annual.*

Great Britain.

In regard to the New Programme we know at the present moment very little by way of description of the three battleships for which the New Programme provides.

Three new battle-ships.

The First Lord, in his statement to Parliament explanatory of the Navy Estimates for 1892–93, informs us that, "it has been decided that the introduction of quick-firing guns of large calibres and the use of high explosives necessitate changes in the character and distribution of the protective hull armour, and the increase of protection to guns' crews . . . to give even greater relative power and prominence to the secondary armament of quick-firing guns than was done in the Royal Sovereign and Centurion classes;" and he adds that "for the present it is sufficient to say that they will be first-class battleships of large displacement, of high freeboard and speed, large coal capacity, and carrying as a main armament four guns of large calibre, and as a subsidiary armament a large number of well-protected quick-firing 100-lb. guns." He also states that "sketch designs have been prepared, and that it has been shown that, while keeping within the size and cost of recent first-class battleships, vessels possessing adequate powers of offence and defence can be produced on the lines decided upon." No doubt many persons of excellent judgment will view with uneasiness the proposal to continue to build such large and costly battleships as are here proposed; but when the question is fully argued out, as was done in the case of the large ships of the Royal

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Sovereign class, the decision of the Admiralty will probably be largely approved.

No cruisers.

The New Programme does not at present provide for any armoured or protected cruisers, and the only vessels above the size of torpedo-boats proposed to be built are the five larger torpedo gunboats which are described as follows.

Torpedo gunboats.

These five vessels, which are named as a class after the Halcyon, which has already been commenced, have the following principal dimensions:—

Length	250 ft.
Breadth	30 „ 6 in.
Displacement	1070 tons.
Horse-power, with natural draught	2500.
„ „ forced „	3500.
Mean speed on measured mile (natural draught)	17 to 17½ knots.
„ „ „ „ (forced „	19 knots.

The weight of the machinery has been considerably increased as compared with that of the Sharpshooter's, and the maximum horse-power has been diminished in view of the difficulties that have occurred with the locomotive boilers of this class. The armament will include two 4·7-in. quick-firing guns, four 6-pounder quick-firing guns, and five torpedo tubes for 18-in. torpedoes.

Torpedo-boats.

In regard to torpedo-boats, the First Lord tells us that provision will be made for building by contract ten first-class torpedo-boats which will embody the numerous improvements which have been made in this class of vessel in the last few years, but no dimensions or other particulars are given.

Royal Sovereign.

In our corresponding chapter in the *Naval Annual* for 1891, we gave certain details of the first-class battleship Royal Sovereign, which was floated out of the dock in which she was built at Portsmouth in February 1891. Since that date the construction of that ship has been pushed on with great rapidity, and it now seems probable that by the 31st May, 1892, she will be complete in every respect for actual service. As the ship is stated to have been commenced on 30th September, 1889, she will have been built and completed in every respect well under three years.

Rapidity of construction.

The Trafalgar, also built at Portsmouth, is of 2200 tons less displacement than the Royal Sovereign. She was built and completed in about three years and three months, and the rapidity of her construction was justly considered as unprecedented. The rapidity of construction of the Royal Sovereign is more extraordinary still, and it reflects the greatest credit on the officials in charge of her

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construction at the dockyard, as well as on the constructive branches of the Admiralty at Whitehall.

Not only, however, are the Admiralty employés concerned in attaining this grand result, but contractors who supply material, machinery, &c., must also have made great exertions to prevent delay on their account. In a report in the *Times* of 7th January last, the writer points out the precision and promptitude with which the armour was supplied in the following words:—

This result partly due to punctuality of contractors in supplying armour.

"The whole of the compound armour has been supplied by the firm of Messrs. Charles Cammell & Co., Sheffield, according to Wilson's patent. It was delivered with great promptitude, and, as it was all erected at their works previous to its being forwarded to Portsmouth, the plates dropped into their assigned places without their having to be touched up by machinery. The belt armour weighs 1096 tons, and varies in thickness from 18 in. to 14 in., tapering below the water-line. It has a depth of about 8 ft. 8 in., and extends 252 ft. amidships, a length of protected area which rendered it expedient to adopt a reduced *maximum* thickness as compared with the belt of the Trafalgar. The aggregate weight of the bulkheads is 170 tons. They vary in thickness from 16 in. to 14 in., and are tapered in the vertical section. The two barbettes are pear-shaped in plan, the greater diameter being 38 ft. 2 in. The armour on the side of the barbettes, in the direction of this diameter, is 17 in. thick. The small end is bent to a radius of 6 ft., and the armour is 11 in. and 16 in. in thickness. Each barbette measures 54 ft. 1 in. in extreme length, and the weight of steel-faced armour forming the structure is 650 tons. The conning tower has an inner diameter of 9 ft. 8 in., and is built of 12 in. and 14 in. armour, of a total weight of 48¾ tons. The four casemates for the protection of as many quick-firing guns, though not peculiar to the Royal Sovereign, having been supplied by the same manufacturers to the Hawke and Endymion, nevertheless must be numbered among the novelties of her equipment. They are composed of 6-in. plates in two sections, and are bent to difficult curves, requiring very intricate and delicate machine work to adapt them to the exigencies of the design. This armour was the last to be supplied to the ship, and, notwithstanding its special contours and character, Messrs. Cammell anticipated the demands of the builders in the delivery of the plates. The thin armour for the protection of the sides and screens above the belt is manufactured of specially prepared armour steel. It has a thickness of 3 in. and 4 in., and weighs 223 tons. The armour specified represents an aggregate of 2902 tons, and is

Distribution and weight of armour.

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secured by 125 tons of bolts; and if to this is added the protective steel decks, the aggregate of armour carried by the battleship will amount to 4500 tons."

Empress of India.

The Empress of India (was Renown), a sister in every respect to the Royal Sovereign, was launched in May 1891 at Pembroke. As the drawings of the ships would no doubt be sent about the same time to both, the efforts of the smaller compare most favourably with those of the larger dockyard. After the Empress of India was launched the steam machinery was placed on board by the contractors, and further work done on the hull at Pembroke, and the ship went round to Chatham to receive her guns, and to complete in other respects for sea, at the end of February 1892.

Hood.

The turret-ship Hood, the third ship of the eight first-class battleships, of 14,150 tons, was put afloat on the 30th of July, 1891.

In describing the floating out of the ship, the *Times* states that it may be remembered that the Hood is one of the eight first-class battleships called for by the Naval Defence Act. Of these, however, she is the only turret-vessel, the others being built on the barbette principle. She has been less than two years in hand, but is in a far more advanced state than is usual at the end of such a time—a fact that will not be lost sight of in the comparison between Royal dockyards and private firms in the rate of building armoured ships. Her length is 380 ft.; breadth, 75 ft.; draught of water forward, 26 ft., and aft, 28 ft.; displacement, 14,150 tons; I.H.P., 13,000; speed (in knots), 17½. Her armament is to consist of four 13½-in. breech-loading guns in turrets, ten 6-in. quick-firing guns, ten 6-pounder quick-firing guns, and nine 3-pounder quick-firing guns, besides seven torpedo dischargers and boat, field, and machine-guns. Her total complement will number 634. It is calculated that her weight when floated was 7500 tons. Her engines, which are by Messrs. Humphrys, Tennant & Co., have not yet been erected on board. The total cost of the vessel will amount to about £900,000. It is expected that in a few months the Hood will be ready for commission.

Repulse.

The fourth ship of the class, the Repulse, was launched at Pembroke on the 27th of February, 1892. Her first keel plate was laid in January 1890, so that she was only about twenty-five months on the stocks. This is a very remarkable result when it is remembered that Pembroke is but a small dockyard, and that two of the first-class battleships of this class were building there at the same time. The weight of the ship when launched was no less than

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7650 tons, which exceeds that of any other ship hitherto launched either in the royal dockyards or by private firms.

The fifth ship of the class, the Ramillies, was launched from the yard of Messrs. J. & G. Thomson at Clyde Bank, Glasgow, on March 1st, 1892. **Ramillies.**

The three remaining ships of the class, the Royal Oak at Messrs. Laird's, Birkenhead, and the Resolution and Revenge at the Palmer Company's yard, Jarrow, are still on the stocks, but it is quite possible that they are retained there for greater convenience in carrying out the work of building and completing. **Royal Oak, Resolution, Revenge.**

The second-class battleships Barfleur and Centurion, and all the cruisers and smaller vessels building or completing at the dockyards and by contract, have been fully described in the former volumes of the *Naval Annual*, and their dimensions and other particulars respecting them are given in the Alphabetical List and in the Plates in Part II. of this volume. It is considered unnecessary to repeat detailed descriptions which have already appeared in the *Naval Annual*. **Second-class battleships, &c.**

FRANCE.

In the *Naval Annual* for 1891 a description was given of one of the latest first-class battleships—the Jauréguiberry—which is now building at the Forges et Chantiers Company's works at La Seyne, near Toulon.

We now proceed to describe the Massena, one of the first-class battleships in the New French Naval Programme which is to be commenced forthwith at the works of the Société des Chantiers de la Loire. She is designed by M. de Bussy. **Massena.**

Her principal dimensions are as follows:—

Length	363 ft. 6 in.
Breadth	65 „ 6 „
Extreme draught of water	26 „ 3 „
Displacement	11,700 tons.

The maximum horse-power of the engines with forced draught is 11,000, and the estimated speed at the load draught and with forced draught is 18 knots. The ship, like the Dupuy de Lôme, and the United States and German cruisers described later, will be fitted with three screw propellers.

The bunkers will contain 585 tons of coal without trimming of bunkers, and about 25 per cent. more if patent fuel is carried.

The radius of action of the ship at 10 knots will be 4000 knots.

The maximum thickness of the side armour is 17¾ in. The armament will consist of two 30-cm. breech-loading rifled guns,

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one mounted in each turret, one forward and the other abaft; two 27-cm. guns of the same description, one on each side; eight 14-cm. quick-firing guns, four on each side. There will also be four 10-cm. quick-firing guns, four 65-mm. and twelve 47-mm. quick-firers, and ten 37-mm. machine-guns. The 47-mm. and 37-mm. guns will be mounted in the tops of the two military masts with which the ship is fitted.

The ship will also be provided with four torpedo launching-tubes, two fitted forward and two abaft. The Massena will be the first French ship fitted with under-water torpedo dischargers.

The other battleship—a sister to Massena—will be laid down a little later on in the year.

Brennus. The first-class battleship Brennus was launched at the Government Dockyard at Lorient on the 17th of October, 1891; and the following description of her has been taken from the excellent French journal *Le Yacht.*

The ship was both designed and built under the directions of M. Huin, who also designed the Charles Martel. Her construction was suspended for a considerable time, and she was again taken in hand in January 1889. In January 1892 she was advanced to sixty-two hundredths, and by January 1893 it is expected she will be advanced to eighty-seven hundredths. In 1893 the steam and other trials will be carried out, and it is expected that she will be completed in five years from the time she was retaken in hand.

The ship is 361 ft. long between the perpendiculars, 67 ft. broad, the mean draught of water is 26 ft. 3 in., and the displacement about 10,983 tons.

The hull is built entirely of chrome steel, except the stem and stern post, which are to be iron forgings.

The Brennus has no spur, but has a straight stem with a recess made for the projecting armour. The stern projects some 14 ft. beyond the after side of the stern post. The ship's lines are exceedingly fine, like those of the fastest steamers.

Water-tight divisions. The Brennus has eight double transverse watertight bulkheads, and five single ones, besides a large number of partial transverse bulkheads. Throughout the engine room there is a double longitudinal bulkhead running up to the main deck. The boiler-room is divided into three nearly equal compartments by two longitudinal bulkheads extending up to the main deck.

Masts. There are two military masts. They are 6 ft. in diameter up to lower top. They have an internal steel tube, concentric with the outer one, about 2 ft. in diameter, which extends to the upper

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top, and is used for passing up the ammunition to the guns in the tops. Between the outer and inner tubes there are ladders fitted for giving access to the tops from the decks. The foremast is surrounded by a conning tower which is protected by armour 4¾ in. thick. Conning tower.

There is an armour-belt fitted from one extremity of the ship to the other, which with the wood backing forms a projection of about 2½ ft. beyond the other portion of the topsides. This projection forms an outside walk, of which the deck is plated with 4-in. steel plates. The armour-belt is in two strakes. The upper strake extends about 2 ft. above the load water-line. It is 15¾ in. thick at the upper edge, and 13¾ in. at the lower edge. The thickness of the lower strake at the upper edge is the same as that of the upper strake at the lower edge—13¾ in., and 10 in. at the lower edge. Behind the armour there is teak backing about 20 in. thick. Armour belt.

There are two coffer-dams filled with light water-excluding material. Both are continuous from one end of the ship to the other. One is situated behind the armour-belt, and extends inwards to a continuous longitudinal bulkhead, and it is subdivided by numerous transverse bulkheads. The second or upper one extends from the main deck to about 4 ft. above it. Coffer-dams.

The topsides of the vessel are high, and above the armour-belt the side is protected by steel armour 4¾ in. thick to a height of about 5 ft. forward and 4 ft. aft. Topsides.

The armour-deck is in three thicknesses, making up a total thickness of 4¾ in. All openings in this deck are protected by glacis plates. In the battery several traverses for protection against splinters are fitted. Armoured deck.

A central fort supports four turrets and encloses the two funnel casings. It has two decks, and extends from the main to the upper deck. Its sides are protected by 4-in. steel armour.

The principal armament consists of three 34-cm. (58-ton) breech-loading rifled guns. Two of them are placed in the foremost turret, and the third in the after turret. Their axes are at the middle line of the ship, and they are worked by hydraulic power. They are pear-shaped in form. The foremost is protected by 17¾-in. armour, and the after one by 15¾-in. armour. The arc of fire in both the foremost and aftermost turret is 270°. The projectiles for these guns weigh 1000 lbs., and their initial velocity will be 2624 ft. per second. Principal armament.

The secondary armament is composed of ten 16-cm. breech-loading rifled guns. Six of them are placed on the deck in the central fort, and the remaining four in armoured circular turrets placed on the deck above. These turrets are protected by 4-in. steel armour, and Auxiliary armament.

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they are moved by hydraulic gear. There are also four 65-mm. quick-firing guns, eight 47-mm. guns of the same description, and eight 37-mm. machine-guns. There are five torpedo launching-tubes; four of them are placed at the angles in the central fort, and the remaining one right aft.

The machinery is triple-expansion, and of a collective power of 14,000 horses. There are two propellers, and the estimated speed under forced draught is 17½ knots.

Bouvines class.

In the *Naval Annual* for 1891, at page 137, we gave in detail a description of these ships. Subsequent to the design being approved two of them have been modified, viz., the Bouvines and the Tréhouart. These two will in reality be small sea-going ironclads, while the two others, the Jemmappes and Valmy, remain as intended—coast-defence ships.

The first two will have lofty upper works, and the two others will be, as originally intended, low in the water forward.

All of them follow the design of the Furieux, one of the ships which were at Portsmouth last year.

The Bouvines was launched at La Seyne, near Toulon, on the 29th of March, 1892. The Tréhouart is building at Lorient, and the Jemmappes and Valmy at St. Nazaire.

The following are the principal dimensions and other particulars of the ships as now building:—

—	Bouvines and Tréhouart.	Jemmappes and Valmy.
	ft. in.	ft. in.
Length	285 0	285 0
Breadth	58 4	57 4
Mean load draught of water . .	22 0	22 0
	tons	tons
Displacement	6590	6590
Horse-power.	7500	7500

It will be seen that the dimensions of the two classes are alike in all respects, except that the sea-going ships are one foot broader.

The engines are triple-expansion, and there are sixteen Allest boilers.

Jemmappes and Valmy.

The Jemmappes and Valmy are (and it was intended that all four ships should be) protected by an armour belt having a maximum thickness of 17¾ in., and by an armoured deck 2¾ in. to 4 in. thick. The armour of the turrets is 17¾ in. thick, and that of the ring at the

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base 15¾ in. thick. The roof of the turrets is formed of plates 2¾ in. thick.

The protection of the conning tower is 3¼ in. thick. The shields to the 10-cm. are also 3¼ in. thick. Bouvines and Tréhouart.

To make up for the weight of the higher topsides in the Bouvines and Tréhouart, the calibre of the guns forming the principal armament has been reduced, and also the thickness of the turret armour.

The turret armour has been reduced from 17¾ in. to 14½ in., and that of the ring at the base of the turret from 15¾ in. to 12½ in. The armoured shields for the 10-cm. guns have been replaced by others of 1½ in. thick.

The armament of the two classes will be as follows:—

—	Bouvines and Tréhouart.	Jemmapes and Valmy.
Principal Armament . . .	2 30-cm. B.L.R.	2 34-cm. B.L.R.
Auxiliary Armament . . .	4 10-cm. Q.F.	4 10-cm. Q.F.
Torpedo Dischargers . . .	2	2

GERMANY.

The principal dimensions of the twin-screw battleship Kurfürst Friedrich Wilhelm, which was launched at Wilhelmshaven on the 30th of June, 1891, are as follows: length, 354 ft. 6 in.; beam 64 ft.; draught of water, 24 ft. 7 in. The hull is of steel, there is a double bottom, and the ship is divided into 120 watertight compartments. Further protection is provided by a 15¾-in. compound armour belt, supported by an 8-in. teak backing on the Krupp system, in way of the vital parts; and by a 2½-in. steel deck. She will be fitted with triple-expansion engines, to work up to 9500 horse-power, and she is expected to realise a speed of 16 knots. The armament will consist of six 28-cm. guns, mounted in pairs, in three barbettes, six 10½-cm. (4-in.) and eight 87-mm. (3½-in.) quick-firing guns, besides lighter machine-guns mounted in the military tops. She will be fitted with several torpedo launching-tubes. The three barbettes are placed in the centre line of the ship, as in the Amiral Baudin, but the fore-turret is elevated on a lofty superstructure which extends for almost half the length of the ship. Abaft the fore-turret is the battery for the 4-in. quick-firing guns, protected by thin armour to exclude the new explosives. The foremast and funnels are within the battery, abaft which the deck is lower; the

Kurfürst Friedrich Wilhelm class.

Armour.

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main-mast is between the centre and after barbettes. The 3½-in. quick-firing guns will be mounted on bridges forward and aft and between the masts. The vessel will carry two steam vedette-boats, besides twelve other boats. She will be heated by steam and lighted by electricity.

Two sister-ships, the Brandenburg and Wissenburg, were also launched in 1891, and the remaining ship (C) of the same class is still on the stocks at Stettin.

Empress Augusta.

The German armoured cruiser Empress Augusta, hitherto known as Cruiser (H), was launched at Kiel on the 15th of January, 1892.

It was intended that this ship should have a displacement of 5500 tons, but the original design has been very much modified and her dimensions and displacement increased. Instead of having two screws only, as intended, she will now, like the Dupuy de Lôme, be fitted with three screws. Her length is 393 ft. 9 in., her breadth 49 ft. 3 in., her draught of water 23 ft., and her displacement 6052 tons. The ship is built throughout of steel, and has an armoured deck of steel plates with an aggregate thickness of 3 in. The collective horse-power of the engines is 12,000. For general cruising purposes, and with speeds up to 12 knots, it is intended to use the centre screw only. The two side screws alone are expected to give a speed of 18 knots, and with the three screws the estimated speed is 20 knots. The armament is to consist of twelve long 15-cm. breech-loading rifled guns, and eight 8·7-cm. quick-firing guns. There will also be machine-guns and torpedo dischargers.

Speed.

Armament.

Russia.

Navarin.

The twin-screw barbette battleship Navarin, which was launched at St. Petersburg in October 1891, is of the following dimensions:—

Length	338 ft.
Breadth	67 „
Draught of Water	25 „
Displacement	9476 tons.
Collective Horse-power of Engines	9000.
Estimated speed	16 knots.
Coal supply	700 tons.

The maximum thickness of the armour on the partial belt is 16 in., and that on each of her two barbettes is 12 in.

Each barbette contains two 12-in. (52-ton) breech-loading guns; in the central battery there are eight 6-in. guns of the same description, and on the hurricane deck there will be ten quick-firing guns. There are six torpedo dischargers.

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United States.

The Secretary of the U.S. Navy in his report for 1891 states that:—

"Of the new construction undertaken during this year, by far the most important is protected cruiser No. 13. This vessel, of 7500 tons displacement, is a sister-ship to cruiser No. 12. The peculiar advantages of these two cruisers consist in their extraordinary coal endurance and their high speed, in both of which respects they have no equal among the large cruisers of the world. With a maximum speed of 22 knots an hour and a sustained sea speed of 21 knots, they can safely be counted on, in any ordinary sea, to overtake any commerce destroyer, any commerce protector, or any mercantile vessel now afloat, while their ability to cruise for great distances without recoaling makes them a peculiarly important addition to a Navy destitute of coaling stations abroad. Their triple-screw propulsion, one of their most important and original features, is at once effective for high speed and economical for ordinary service. The arrangement of the screws, tending to secure constant immersion in the water, is calculated to prevent the racing so common in single-screw and twin-screw vessels, which leads not only to reduction of speed, but to material increase of loss from wear and tear. Added to these advantages are a complete armour protection against light guns, and a battery comprising one 8-in. and two 6-in. breech-loading rifles of 40 calibres, eight 4-in. rapid-fire guns of the armour-piercing type, with twenty small-calibre rapid-fire guns, and five torpedo tubes, making them formidable antagonists for any vessel they may be called upon to fight.

Cruiser No. 13.

"This vessel and her sister-ship, No. 12, are to have a guaranteed speed of 21 knots for four hours in the open sea, a condition which, as far as known, no shipbuilding firm anywhere, except Messrs. Cramp, had at that time ever undertaken to fulfil."

The contract for building the ship has been entrusted to the eminent firm—Messrs. Cramp of Philadelphia—the contract price being £538,000.

Brazil.

The Elswick firm are now building two vessels for the Brazilian Government, both of which were designed by Mr. Watts, the firm's naval constructor. One is a twin-screw protected cruiser, and the other is a gunboat.

Protected cruiser.

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Protected Cruiser.

The dimensions of the protected cruiser are :—

Length between perpendiculars	210 ft.
Breadth	35 „
Draught of water	13 „
Displacement	1300 tons.

The hull is built entirely of steel, and she has an armoured deck 1 in. thick over the horizontal portion, and 2 in. thick over the sloping portion. The horse-power of the engines is 3300; the estimated speed 17 knots; and the coal supply 170 tons.

The armament will consist of six 4·7-in. quick-firing guns, four 6-pounder quick-firers, and six machine-guns. There are also four Whitehead torpedo dischargers, two fixed tubes, and two carriages.

Gunboat.

The dimensions of the twin-screw gunboat are :—

Length between perpendiculars	165 ft.
Breadth	30 „
Draught of water	11 „
Displacement	800 tons.

The hull is built of steel throughout and sheathed with wood; the horse-power of the engines is 1200; and the estimated speed is 14½ knots.

The armament will consist of four 4·7-in. quick-firing Armstrong guns; three 6-pounder quick-firers, four machine-guns, and two launching carriages for Whitehead torpedoes.

Chili.

The description of the ironclad ship Capitan Prat, now practically completed, has already been given in the *Naval Annual* for 1890. This ship was built for the Chilian Government at La Seyne, near Toulon, as were also two cruisers, Presidente Errazuriz and Presidente Pinto. It will be remembered that none of these ships was able to take part in the recent war.

The three ships named were all designed by M. Lagane, the Director of the works at La Seyne, and the machinery was manufactured at the Company's works at Marseilles. The Presidente Errazuriz was launched in June 1890, and the Presidente Pinto in August 1890.

Presidente Errazuriz. Presidente Pinto.

The dimensions of these cruisers are as follows :—

Length	268 ft.
Breadth	35 „ 9 in.
Mean draught of water	14 „ 6 „
Displacement	2080 tons.

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The hull is constructed throughout of steel. There is no double bottom; but the ship is divided transversely into twelve water-tight compartments. With the exception of the coal-bunker bulkheads at the sides of the boilers there are no longitudinal divisions.

There is a steel armoured deck throughout varying on the slopes from 2½ in. to 1½ in., and on the flat portion from 1½ in. to 1¼ in. The highest point of this deck is about 2½ ft. above the load water-line.

They are wood sheathed and coppered. There are two military masts, with arrangements fitted inside for hoisting up the ammunition for the service of the guns in the top.

A conning tower is fitted on the fore-bridge, which is protected by steel plates of an aggregate thickness of about 3 in.

The propelling machinery consists of two triple-expansion engines slightly inclined from the horizontal, placed in separate engine rooms. On trial the aggregate horse-power of the engines with natural draught was 3560, and with forced draught 5500. The speeds were respectively 17 and 18½ knots. The normal supply of coal is 170 tons, but provision is made for carrying 230 tons. With the larger supply the radius of action at a speed of 12 knots will be 4500 knots.

The armament of both ships consists of four 15-cm. quick-firing Canet guns, placed on sponsons, two on each side of the ship; two 12-cm. guns of the same description, one placed on the forecastle and the other on the poop; four quick-firing 6-pounder Hotchkiss guns; four Hotchkiss 37-mm. revolvers; and two Gatlings for the tops. There are also three torpedo dischargers, one forward and the others on the broadside.

The Presidente Errazuriz had her guns on board when the Chilian war broke out, but those of the Presidente Pinto were not on board.

JAPAN.

Messrs. Sir Wm. Armstrong, Mitchell & Co. are now building a fast twin-screw protected cruiser for the Government of Japan, which has been designed by Mr. Watts, the firm's naval constructor, and of which the following are the leading particulars :—

Length between the perpendiculars	350 ft.
Breadth	45 „
Draught of water	16 „ 6 in.
Displacement	4200 tons.
Aggregate horse-power of the engines	15,000.
Estimated speed	23 knots.

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The ship is fitted with a strong armour deck, with sloping portions as usual. The thickness of the plating on the slopes is 4½ in. to 3½ in., and on the flat portion it is 1¾ in. thick.

The armament will consist of four 6-in. quick-firing guns, eight 4·7-in. quick-firers, and twenty-five smaller quick-firing and machine-guns; also two fixed tubes, and four launching carriages for Whitehead torpedoes.

When necessary for making long passages provision is made for a supply of coals of 1000 tons.

F. K. Barnes.

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CHAPTER VI.

MARINE ENGINEERING.*

If the twelve months that have elapsed since the last appearance of the *Annual* have not been remarkable for any startling new departure in marine engineering, they have still been far from unproductive of interesting events. During this period the great bulk of the orders for steam machinery given out by the Admiralty on account of ships ordered under the Naval Defence Act of 1889 have either been completed or are fast approaching completion. The aggregate output is unparalleled, and quite beyond the capabilities of any country but Great Britain. The machinery for no less than eight first-class battleships, the Hood, Empress of India, Repulse, and Royal Sovereign, built in Government establishments, and the Ramillies, Resolution, Revenge, and Royal Oak, built by private firms, will be ready almost as soon as this book is in the hands of its readers.

Engines of new battle-ships.

The private firms who build the four last-named ships have also been entrusted with the supply of their machinery; but the engines of the Government-built ships have all been constructed by Messrs. Humphrys and Tennant, of Deptford Pier. They are all triple-expansion vertical engines, of 13,000 horse-power, and are distinguished by no particular novelty of design, though certain improvements have been introduced in matters of detail. In general arrangement they closely follow those fitted by the same makers in vessels of the 'Admiral' class, and in the Victoria and Sans Pareil. The high-pressure, intermediate, and low-pressure cylinders are of 40 in., 59 in., and 88 in. diameter respectively, with a stroke of 4 ft. 3 in. The surface condensers are of gun-metal, and their air-pumps are driven directly from the low-pressure pistons; the slide-valves are of the usual description, worked by a link motion with solid sectors. There are eight single-ended boilers which will work at a pressure of 150 lbs., with 19,560 ft. of heating surface, and 700 ft. of grate surface. The total weight of the propelling machinery

* Authorities:—The *Times*, *Globe*, *Marine Engineer*, and *Liverpool Journal of Commerce*; Messrs. Humphrys, Tennant & Co.; Messrs. Maudslay, Sons & Field; and the Naval Construction and Armaments Company.

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amounts to 1110 tons. There is little doubt but that these engines will fulfil the expectations of those responsible for their design and manufacture. It is a noteworthy fact that, with one solitary exception, no trouble has ever been experienced with the machinery of our battleships, for the simple reason that the sufficient space and weight have been allowed for it which have too often been denied in the case of the cruisers. In the Royal Sovereign and her sisters, while everything has been done to save weight as much as possible, sufficiency of strength has never been sacrificed to excessive lightness. There is also another reason why the engines of ironclads are at a great advantage over those of cruisers. The enormously greater strength and solidity with which the hulls of battleships are of necessity constructed resist and absorb the vibrations which in a lightly built cruiser are so prejudicial to the welfare of machinery working at a high rate of speed. In an ironclad the engines rest on a firm foundation; in cruisers built for extreme speed and nothing else, they have actually been bolted directly to the skin of the ship.

The Vulcan.

From an engineering point of view, the most interesting ships in the Navy during the past year have been the Vulcan, torpedo depôt-ship, and the remarkable cruisers Blake and Blenheim. The Vulcan, specially built as a floating factory and laboratory for torpedo and mining service, and for the conveyance of second-class torpedo-boats for the use of a fleet, was laid down in June 1888, and launched in the same month of the following year. While in dry dock, at the beginning of 1890, it was recognised that her hull showed signs of weakness, and though it was strengthened in various particulars, there were some who foretold that it would never satisfactorily withstand the strain of the machinery at full speed. It was not, however, in this direction that trouble was experienced. The Vulcan was intended by her designers to have a speed of 20 knots, given to her by engines developing 12,000 horse-power; but in the Navy Estimates for 1891–92, she was one of the ships to which the somewhat ominous footnote applied, "It is not considered necessary to try these ships with the maximum of forced draught." She is fitted by Messrs. Humphrys, Tennant & Co. with triple-expansion engines of the same type supplied by them to the Royal Sovereign, and other battleships mentioned above. The cylinders are of the same diameters with the same stroke of piston, but it is easy to imagine the difference of the conditions under which they will work in the Royal Sovereign and in the Vulcan. There are four double-ended boilers with twenty-four furnaces, and one single-ended boiler with three furnaces for auxiliary

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purposes, with a working pressure of 155 lbs. on the square inch. Some time before proceeding on her first trial, the common combustion chambers of her double-ended boilers had been divided by being bricked off, and a certain number of tubes had been removed in order to improve the circulation of the water over the tube-plates, as suggested to the Admiralty by Mr. Seaton, of Earle's Company, Hull. Repeated failures had by this time caused serious misgivings to the authorities as to the capacity of the newest type of naval boiler to resist the pernicious effects of injudiciously applied forced draught.

First trials of Vulcan successful.

After many delays, due to various causes, the Vulcan, on April 23, 1891, had a continuous eight hours' trial with natural draught at Portsmouth. She left the harbour shortly before eight, and at half-past everything was in readiness for the trial to begin, the furnaces burning brightly, the pistons moving at the rate of 750 ft. per minute, and the spume thrown off by the cranks affording a pretty sure indication that there was not likely to be any trouble with hot bearings. The ship had been brought down to her load-line by means of iron ballast and coal, which gave her a trim of 22 ft. forward and 24 ft. aft. On reaching the roadstead she encountered a north-easterly breeze blowing with the force of five—which subsequently moderated—and a strong tide, the combined results of which upon the progress of the vessel may be judged from the fact that while her speed upon the measured mile, wind and tide in her favour, was 19·67 and 20 knots, the speed in the opposite direction was only 17·73 and 17·31 knots. In going to windward considerable volumes of spray broke over her port bow, not in consequence of any liveliness on her part—for she proved remarkably steady—but owing to the fountains produced by one of her torpedo ports. The contract power of the Vulcan, with natural draught, is 7200, and it soon became manifest that there would be no difficulty in obtaining it. The first hour gave 8753 and the second 8777, after which the air pressure required for assisted, not forced, draught was reduced below the Admiralty limit, and the trial proceeded smoothly and without incident to the conclusion, with an average of eighty-eight revolutions a minute by each set of engines. The other engine-room data were: boiler pressure, 146 lbs.; vacuum, 29·00 starboard, and 28·25 port; indicated horse-power, starboard, high, 1206, intermediate, 1398, low, 1454; port, high, 1289, intermediate, 1308, low, 1511; thereby giving a total of 4058 from the starboard and 4108 from the port engines respectively, and a collective horse-power of 8166, very nearly 1000 more than what had been stipulated for. The mean

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air pressure was ·457 in., and the consumption of coal amounted to 2·2 lbs. per unit of horse-power per hour, equivalent to a total of 64·29 tons during the eight hours' trial. The mean speed realised, as determined by four runs on the measured mile, was 18·537 knots —half a knot in excess of the estimate. These results were considered very satisfactory, and the trial was pronounced a great success. It will be observed, however, that as yet 12,000 horse-power had not been developed nor a speed of 20 knots attained; but the Admiralty, in the Navy Estimates, had given fair warning that they did not intend to try for either.

Further trials. The further trials of the Vulcan were entirely unsatisfactory. At first it was generally assumed that her boilers must be taken out and new ones substituted; but, from experiments that at the moment of writing are in active progress, both the Admiralty and the contractors are sanguine that the difficulty arising from her leaky boiler-tubes will be effectually surmounted without entailing the removal of the boilers.

Blake and Blenheim. The performances of the Blake and Blenheim, when the particulars of their design were first made public, were looked forward to with eager interest by the engineers not only of this country, but, it may be said, of all Europe and the United States. They were the largest cruisers ever built, and were fitted with engines of unprecedented power, designed to give the vessels a speed hitherto unknown in fighting ships, of whose efficiency, however, speed is only one, though a most important, element. But after the Vulcan's failure, due, be it always remembered, to Admiralty design, not to manufacturers' workmanship, it was not thought prudent to press *à outrance* the double-ended, common combustion-chambered boilers, of the same pattern as the Vulcan's, that had been fitted to the two big cruisers. There was no doubt that a mistake had been made; valuable experience had been bought at a heavy price, and it was best to acknowledge the unpleasant facts with as graceful a mien as might be. Hence, early last autumn, Messrs. Maudslay were notified that the machinery of the Blake would be accepted if it answered all the stipulated requirements when working up to 13,000 horse-power. Now the Blake had been intended to attain a maximum speed of 22 knots, and to this end had been supplied with engines calculated to develop 20,000 horse-power. The engines could have done much more than this if they had had good boilers in front of them.

The First Lord of the Admiralty had announced, in his explanatory statement of the Navy Estimates a year before, that "instead of continuing to design the boilers so that the steam required for full

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forced draught-power can only be obtained by the exertions of the very best stokers and picked coal, on measured mile conditions, the present policy is to increase the weights and the dimensions of the boilers, so that the higher powers occasionally required may be more readily developed and maintained." Unfortunately, this wholesome change of tactics on the part of the Engineering Department of the Admiralty was not resolved upon until it was too late for the Blake to benefit by it, and her boilers have, very wisely, never been subjected to forced draught.

Engines of Blake.

Her engines, like those of the Blenheim, are of a type never previously adopted in this country, though it has in several instances found favour with the Italian Government. They consist of four distinct sets of triple-expansion, inverted-cylinder engines, and occupy with their adjuncts nearly two-thirds of the length of a ship of 9000 tons displacement. They are placed in four separate compartments, two sets being coupled together on the starboard and port sides respectively for driving each propeller. There are a total of four high-pressure cylinders, 36 in. in diameter, four intermediate cylinders, 52 in., and four low-pressure cylinders, 80 in., with a stroke of 4 ft. Each set of engines has an air-pump 33 in. diameter and 2 ft. stroke, and a surface condenser having 12,800 tubes and an aggregate surface of 2250 sq. ft., the length of the tubes between the tube-plates being 9 ft. There is also in each compartment one centrifugal circulating pump, 3 ft. 9 in. in diameter, driven by a small independent engine, and capable of pumping from the bilges as well as the sea. The screw propellers are 18 ft. 3 in. in diameter, with a mean pitch of 24 ft. 6 in. Steam is supplied by six double-ended boilers, having four furnaces at each end, and one auxiliary boiler. The total area of fire-grate surface is 863 sq. ft., and of heating surface, 26,936 sq. ft. Each engine-room is kept cool by four 4 ft. 6 in.-fans. Forced draught was intended to be produced by twelve 5 ft. 6 in.-fans, three in each stokehold. The ship is fitted with Normandy's improved double distillers, capable of furnishing 400 gallons of fresh water per hour. The electric lighting machinery consists of three dynamos of Siemen's manufacture, driven by a Willans engine, each of which is capable of producing a current of 400 ampères. The after main engines can be easily disconnected and worked separately for slow or moderate speeds. And it is on this hitherto untried arrangement that naval sea-going engineers at present look somewhat askance.

Unfair wear probable.

The Blake is now in commission as flag-ship on the North America and West Indies station, and it is highly probable that nine-tenths

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of her work under steam will be of such a description as to be easily performed by the use of her after engines only. It almost stands to reason that if this plan of working is adopted to any considerable extent the bearings of the after engines must wear down, and when in case of emergency it is necessary to couple up the forward engines to obtain more driving power, the shafts will be found to be out of line. This is, of course, at present only what is by experienced men considered likely, or certain, to happen; there has not been time for it to happen yet. Probably, on the first indications of any unfair wearing of the bearings of the after engines, the chief engineer would recommend that one screw only should be used for a time, the ship being kept straight on her course by means of the helm. It has been suggested that if for cruisers of enormous power the system of four sets of engines should become common, an arrangement might be contrived whereby, instead of disconnecting the forward engines altogether, the low-pressure cylinder of each set might be shut off on occasion; but this would involve the giving up of all the economical advantages of triple-expansion at low speeds. This it would be a pity to sacrifice, as we already pay considerably for it in the largely increased area of precious target that we offer to an enemy's fire.

Trials of Blake.

The Blake did very well on her passage round from Sheerness to Portsmouth, and on November 18 went out for her official eight hours' trial with natural draught. The day was rather foggy, and towards the very end of the trial it was deemed advisable to be satisfied with the results of a seven hours' run, as these had been so satisfactory and the light was fading, while the engines were working with a smoothness and efficiency that showed no signs of flagging. The *Globe* gave a concise account of the proceedings:—"The Blake's trial on Wednesday was, as far as it was allowed to go, a magnificent success, on which Messrs. Maudslay may well be congratulated. There was not a single hitch of any kind. The Admiralty orders were to run at about 13,000 horse-power, which was what had been stipulated for with natural draught, but with all four engines linked up and an abundance of steam, an average of 14,500 horse-power was easily obtained. At one time 15,000 was touched, but was not allowed to be maintained; but 16,000, or a little more, could readily have been indicated with the permitted half-inch of air pressure, if the engines had been allowed to use the steam as fast as it was generated. The Admiralty officials, however, perhaps acted wisely in not putting more power through the boilers than they could help, as the result was that not a sign of "weeping" or other complaint

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was shown by them. Engines never worked better or more smoothly, and the entire absence of vibration at all speeds was most remarkable. The speed of the ship was a little disappointing, but the loss of nearly half a knot should be put down to the trial having been run in such shoal water. The Blake's sea speed for twenty-four hours with 14,500 horse-power would probably be at least 19·7 knots. This is very good, though not what was aimed at; but now that the mistake in boiler design has been frankly recognised, the Admiralty will no doubt do much better than this in the near future." The trial attracted an immense amount of attention in all quarters, as the Blake's engines were the most powerful ever fitted on board a man-of-war.

Blenheim.

The Blenheim was just sufficiently later than the Blake to enable the contractors, Messrs. Humphrys, to introduce certain modifications in her boilers, which were originally intended to be the exact counterpart of the Blake's. The combustion chambers are divided by a water compartment, but whether this device will ultimately prove successful is not yet known. The ship made her official eight hours' natural draught trial on her way from Chatham to Spithead, at the end of January last. She did remarkably well, with an air pressure of a quarter of an inch and only 94 revolutions, as she averaged a speed of 20·4 knots, and developed 14,924 horse-power. But on the conclusion of the run some of the boilers were found to be leaking, and the forced draught trial was postponed till their defects had been dealt with, which was expected to mean a few weeks' delay.*

Engines building for first-class cruisers.

Coming now to the consideration of the cruisers provided for under Lord George Hamilton's programme of 1889, we find that the machinery of many has been accepted from the contractors, and that of most of the others is nearly completed. Messrs. Humphrys have just finished the engines for the first-class cruiser Grafton, lately launched at Blackwall, which are on the same lines as those for the Royal Sovereign and her sisters. Messrs. Maudslay are now engaged in putting the machinery on board the Royal Arthur and Theseus; while Messrs. Elder have successfully accomplished their work in the Edgar, and Messrs. Penn are still busy with the Crescent. The Admiralty specifications are so minutely drawn up nowadays, that there is not much room for the display of any great originality of design. In fact, the engines of the different makers only vary in details of arrangement that can hardly be called important. The relative

Royal Arthur.

* Further particulars of the behaviour of the Blenheim's boilers will be found in Lord George Hamilton's explanatory statement, on page 353.

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capacities of the cylinders, for instance, are not quite the same in the Royal Sovereign as in the Nile. The engines of the Royal Arthur, by the same makers, are of the same type as those of the latter ship. It may be observed, however, that to produce the 12,000 horse-power of the Nile, steam of a pressure of 135 lbs., generated by the combustion of fuel on 603 sq. ft., was employed, while in the case of the Royal Arthur, to obtain the same power, Messrs. Maudslay use steam at 155 lbs. pressure, while the grate surface is increased to 855 sq. ft.; both undoubtedly changes for the better. The framing of the Royal Arthur is to a certain extent novel. Instead of the more usual plan of one strong standard at the back, and two bright columns in front, the cylinders are each supported by four cast-steel columns, which allows of much easier access to the guides and other working parts while under way. The weight of the Royal Arthur's machinery, including the water in the boilers, is 1180 tons, and this may be taken as about the weight allowed for all the new first-class cruisers. The machinery is fairly substantial under these conditions, and, it is hoped, will withstand the trying conditions of naval service, so different from the straightforward work of the merchant service. In the latest engines there is no fancy valve-gear, the old-fashioned link motion alone has been used.

Engines of Royal Arthur.

First-class cruisers.

Of these first-class cruisers of 12,000 horse-power only nine were ordered, but of the second-class type, 3400 tons and 9000 horse-power, we shall soon possess no fewer than twenty-nine. The first-class cruisers are usually spoken of as the Edgar type, and, at the time of writing, the Hawke, sister-ship to the Edgar, and engined, as that vessel is, by the Fairfield Company, is the latest to have completed her steam trials, which she has done in the most satisfactory manner. Each set of engines has three cylinders of 40 in., 59 in., and 88 in. diameter, with a stroke of 4 ft. 3 in. Steam at 150 lbs. pressure is supplied from four double-ended boilers of 16 ft. in diameter and 18 ft. in length, each end of the boilers having four furnaces and two combustion chambers. There is also an auxiliary boiler, 13 ft. in diameter and 9 ft. 3 in. in length. In all there are 35 furnaces and 20,000 sq. ft. of heating surface. The *Engineer* says:—"The first set of trials was made on March 5, the Hawke starting from Sheerness towards Dover, and making an eight hours' run, the speed being determined from the log. The Admiralty designated this a natural draught trial, but perhaps it would be better to describe it as an assisted draught experiment, there being an air-pressure equal to ·3 in. of water in the stokehold. Under

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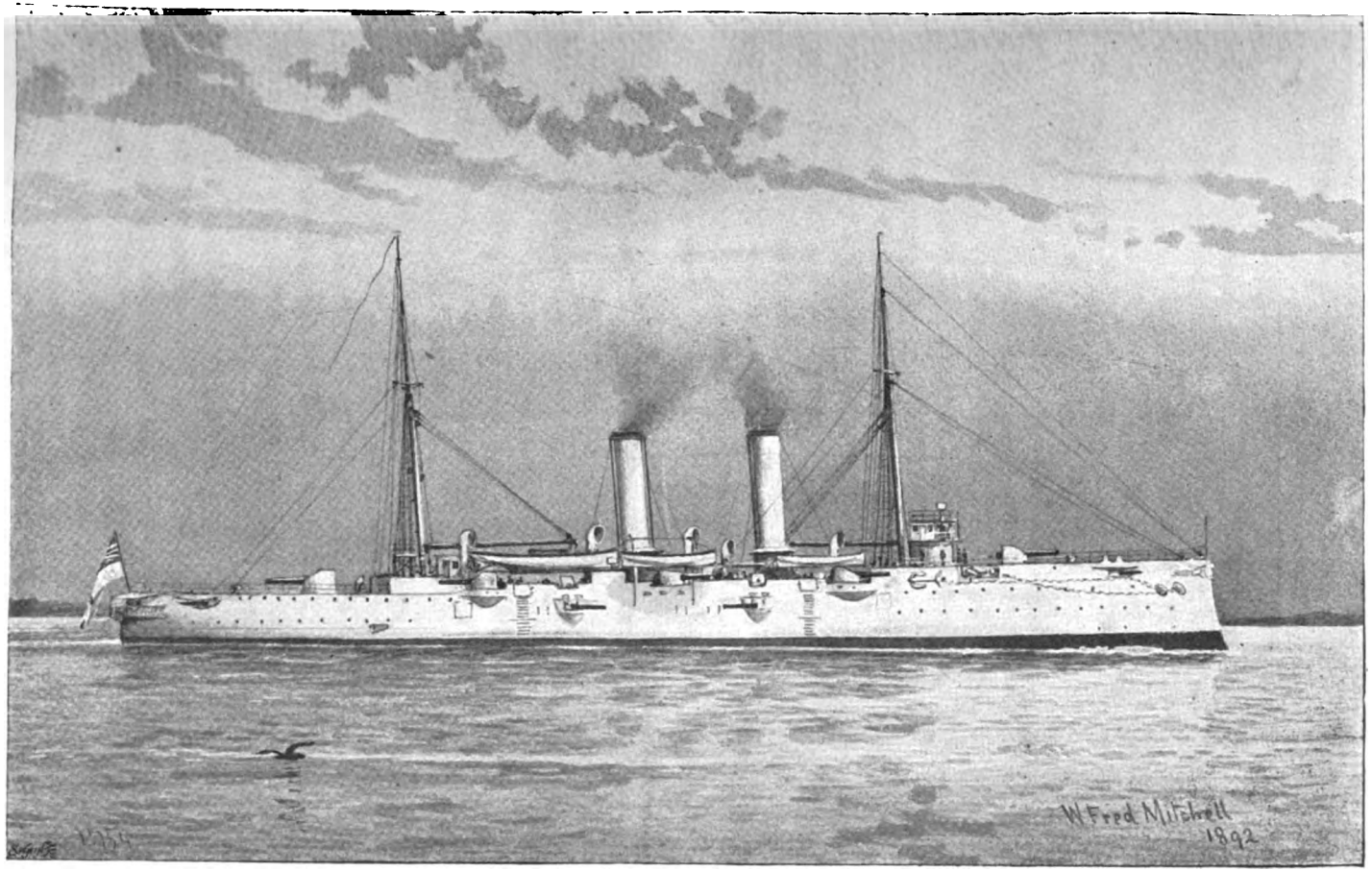

H.M.S. "ROYAL ARTHUR."

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these conditions the engines worked during the eight hours' run at an average rate of 98·46 revolutions per minute, and indicated 10,761 horse-power, which gave a mean speed of 19·5 knots. The result of the first day's trials being considered satisfactory, the next experimental runs were made on March 8, under a moderate forced draught of ·44 in. water pressure. A four hours' run over the same course was made with an average rate of 102·18 revolutions per minute, the horse-power indicated being 12,521, or 521 horse-wer over the contract requirement. It was understood that under is condition the vessel attained a mean speed of about 20 knots. These two days' speed trials passed off without a hitch, and the machinery was at once taken over by the Admiralty authorities, who complimented Mr. Andrew Laing, the manager of Fairfield Engine Works, upon the excellence of the job."

Second-class cruisers.

With regard to the second-class cruisers, it hardly comes within the province of this chapter to dilate on the importance of this class of vessel for general sea work; but it seems worth while to give a somewhat detailed description of the machinery of one of them, as an example more or less exact of all the rest, and we take the Naiad as a fair sample of the lot. She was built and engined by the Naval Construction and Armaments Company, of Barrow-in-Furness. It goes without saying that her engines are vertical and triple-expansion. Each cylinder is separately carried on a tripod, formed of a cast-steel back column, which also acts as a guide, and two turned-steel columns in front. These latter are braced and tied by diagonal stays, and the cylinder tops are further stayed by two fore-and-aft steel stays. Any tendency to vibration, even at high speeds, is thus counteracted. The cylinders are 32½, 49, and 74 in. in diameter, and are jacketed and drained in the ordinary way. There are no receivers proper, but the eduction pipes from each cylinder act as such. All the pistons are of cast-steel, and are of the dished form. Piston-valves are fitted to the high-pressure and intermediate cylinders, and ordinary slide-valves to the low-pressure cylinders. In the south the more usual practice is to employ piston-valves only for the high-pressure cylinders. All the valves are balanced. There are no tail rods. The valves are worked by ordinary link motion, and the reversing is done by means of simple gear of the all-round type of special design, whereby all jarring motion is taken from the reversing levers. The main condensers, electric light, air compressing, and steering machinery are abaft the engines, and the arrangement of the machinery is such that there is ample room, and access to it is easy. There are five boilers, placed

Engines of Naiad.

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in two separate stokeholds; of these boilers two are single-ended, and three double-ended. There are 24 furnaces, each with a separate combustion chamber. The total heating surface is 15,880 sq. ft., and the total grate area is 580 sq. ft.; this gives about 16 horse-power for each square foot of grate—a very fair allowance. Under each furnace is a water ashpan. In each boiler-room are two feed pumps, and in each stokehold are two fans which supply air to the furnaces. Each of the two sets of boilers can supply steam to the two sets of engines; thus, when cruising, one set of boilers can be shut off for cleaning or repairs. To render this possible, of course a good deal of extra steam piping has had to be fitted. All the steam pipes are of copper, and those of large size have been served with copper wire. On this subject the Engineer-in-Chief of the Navy said, in a recent paper:—"On account of the occasionally uncertain behaviour of the copper composing our copper steam-pipes, it has been found advisable in pipes over 8 in. to wind them with $\frac{3}{16}$-in. copper wire, stretched whilst winding to a uniform tension of 3600 lbs. per square inch, the ends of the wire being secured to the flanges. Only straight lengths of copper pipe are used, elbows and ends entering stuffing boxes being made of gun-metal or cast-steel, and in certain cases large steam-pipes have been made of forged steel." For forced draught purposes there are in each of the Naiad's stokeholds two fans, driven by Brotherhood engines, equal to maintaining a pressure equivalent to 3 in. of water—a pressure that will never be employed. The total weight of the machinery, including the water in boilers and condensers, is about 650 tons, giving about 165 lbs. per indicated horse-power. This looks very light if the ship were always going to steam at full speed like an Atlantic liner; but as she will, under ordinary cruising conditions, rarely develop more than 1500 horse-power, which gives a weight of 1000 lbs. of machinery per unit of horse-power, the engines must be considered, for these latter days, of fairly sufficient solidity.

Serving pipes with wires.

Coal bunkers.

The Naiad, like all her sisters, carries 400 tons of coal, supposed to give her a radius of action of 4000 knots at 10-knot speed. The coal-bunkers are arranged so as to afford the greatest possible protection to the machinery, which implies a cellular arrangement, requiring much manual labour to get the coal from the boxes to the fires. This is a detail that has not received anything like the attention it deserves. In too many ships of recent design the gentlemen whose business it was to get out plans for a cruiser, one of whose qualities was to be large coal-carrying capacity, have so managed matters that a large portion of this coal is stowed away in inaccessible

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"pockets," whence it can only be extracted by requisitioning the services of seamen as well as stokers—which should always be avoided unless absolutely necessary.

Electric light.

The Liverpool *Journal of Commerce*, to which we are indebted for many of the above particulars, says that the electric installation is very complete, and is entirely depended on for artificial light, and goes on to remark, "There are, in addition to the usual fixed and portable lamps, three search-lights, which are placed, as is usual in all war-ships, just where they can be manipulated with the greatest risk to the operator, and where they would form a convenient and eligible target to the enemy."

Trials of Naiad.

The Naiad ran her natural draught eight hours' trial at Spithead on October 1. She indicated 7521 horse-power, with a speed of 18·6 knots. As the Naiad had been in the water for twelve months without docking, this result was eminently satisfactory. From her trials, moreover, a very useful "wrinkle" was gained. For a long time great trouble had been experienced with the steel gudgeon-pins of fast-moving engines; they simply pulverised the brass of the bearings in which they worked. The Naiad had two of her pins made of iron, case-hardened, as an experiment, and the result was so satisfactory that the steel pins of the Pallas, which had given an infinity of trouble, were removed, and iron ones substituted. After a hard run these were found to be in splendid condition, and the ship left for China at last, having been long delayed on account of her gudgeons.

Latona.

Some months before the trials of the Naiad, the Latona, a sister-ship built and engined by the same firm, was despatched to Malta and back on an experimental cruise. The results were respectable, but not splendid. On the outward voyage the passage to Gibraltar was accomplished at an average speed of 15 knots, while 17 knots was maintained for 24 hours between Gibraltar and Malta. The return voyage was made under easier conditions of steaming at a 12-knot speed. Under forced draught the Latona realised, on the measured mile at Stokes Bay, just over 20 knots, with 9438 horse-power. The boilers did not leak. This trip of the Latona's was considered by the Admiralty sufficiently typical and important for a special report of the proceedings to be issued to the public.

Engines of Seagull.

Of the first-class twin-screw gunboats, familiarly known as "catchers," of which the Rattlesnake was the earliest example, the Seagull is perhaps a good average specimen in the way of machinery. As in all her class, the engines are extremely light. The cylinders are placed on turned-steel columns with tubular braces, and the

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framing is entirely of cast steel. The diameters of the cylinders are 22 in., 33 in., and 49 in., with a stroke of 2 ft. 3 in. The boilers, which are pressed to 150 lbs., are four in number and of the locomotive type, with a large double fire-box to each boiler. Messrs. Maudslay have constructed the machinery for some half-dozen of these useful craft.

Construction of engines in dockyards.

Quite recently, the Admiralty have sanctioned the construction of marine engines in the Government yards. Formerly, only repairs were undertaken; but as old ships and old machinery became replaced by new, there was not enough work to keep the factories fully employed. To have reduced these establishments would have been unwise in the extreme, as they are not by any means on too extensive a footing for the needs of the country should war be present, or even imminent. It was therefore decided to give them a chance to see what they could do in the way of manufacture. The result has quite justified the experiment. The first set of any importance were the engines of the Phœbe, built at Keyham, from the designs and under the supervision of naval engineers. They were beautifully finished, and more attention had been paid to the accessibility of the working parts than is usual. The Rupert is being fitted with new triple-expansion engines at Portsmouth.

Rupert.

Gleaner.

The Gleaner, one of the Sharpshooter class, has been supplied with machinery made at Sheerness Dockyard, being the second ship both built and engined at that establishment. On her trial she did extremely well—better, in fact, than any other vessel of her class. The engines working at 250 revolutions developed 3630 horse-power, and gave a speed of 20·1 knots under forced draught, and the boilers are said to have stood the test satisfactorily.

Encouraging as these facts may be, it is improbable that the Admiralty will think it advisable to manufacture marine engines to any large extent; and the great engineering firms that have for so long done the bulk of the work for the Navy need not feel any alarm as to any serious diminution in the amount of orders likely to be given them.

New machinery for old ironclads.

One of the most judicious and sensible steps ever taken by any Board of Admiralty has been the fitting of some of our older ironclads with new machinery. Such ships as the Minotaur, Superb, Hercules, Monarch, and others, built with a scrupulous and conscientious attention to strength that it is much to be feared no longer survives as a first principle in our dockyards, may some day form an invaluable second line of battle. When the first race and battle are over, and the swift and the strong are all *hors de combat*, the victory will

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remain with that Power that can bring into action the most efficient unwounded reinforcements. It is to be regretted that the Thunderer should have been supplied with boilers of so injudicious a type that the ship is practically useless for the service of the Mediterranean Station, and is to come home as soon as may be for new ones. Similar boilers were being put on board the Devastation, but the order has been countermanded, and, at the expense of some delay, we may hope that both these ironclads, as well as the Vulcan, will be rendered trustworthy fighting ships.

Induced draught.

A method of increasing the supply of air to the furnaces of marine boilers, known as "induced" draught, first proposed by Mr. Martin, a veteran engineer of Blackfriars, is to receive further attention, and arrangements have been made to carry out more trials in a torpedo gunboat. Experiments were made with this system, as applied to an old discarded boiler of the Polyphemus, as long ago as July 1890, in Portsmouth Dockyard. The results were said to be highly satisfactory at that time; but marine engineers, though always willing to learn, cannot see what material difference there can be, as far as the endurance of boilers is concerned, if the air is driven into the front by a fan, which is called forced draught, or sucked through by a similar fan at the base of the funnel, which is called induced draught. It is satisfactory, however, to learn that, if there is anything in the "induced" draught principle, it is to have a fair trial this year.

Torpedo-boats.

Of torpedo-boats and their machinery there is not much to say, as the Government has not for some years thought fit to add to our undoubtedly meagre stock.* This has given rise to a great deal of discussion as to the merits of torpedo-boats, which cannot be commented on here. Messrs. Yarrow, of Poplar, have lately despatched a very fine first-class boat to Melbourne, for the order of the Victorian Government; but there was nothing new about her machinery, except that it was the best that could possibly be made.

Quadruple-expansion engines.

Quadruple-expansion engines have been fitted to some foreign boats, but it is doubtful if they will come into much favour. They necessarily present a larger target to the quick-firing and machine-guns of a hostile ship, and their advantage in the way of greater smoothness of working is almost lost now that triple-expansion engines have been constructed to run at all speeds in torpedo-boats without any unpleasant vibration, as explained in Mr. Yarrow's paper read before the Institute of Naval Architects.

Triple screws.

Triple screws have not yet been experimented with in the British

* Since this was written the Admiralty have announced their intention of ordering ten torpedo-boats of the newest designs.

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Navy. The *Daily Graphic*, of March 28, wrote as follows on the subject:—

"For some years past the Italian Navy has included a certain number of despatch vessels or small cruisers with triple screws. A few months ago Germany determined to lay down a larger vessel fitted in the same manner, and now news comes from France that the new battleship Masséna, which is designed to be a more formidable fighting craft than anything at present flying the tricolour, is to have triple screws also. The innovation has, as yet, scarcely moved out of the experimental stage, and no one need be very much astonished should he, a year or two hence, learn that triple screws, as applied to large ships, are failures. On the other hand, they may easily turn out to be conspicuous successes. It is claimed on their behalf that they contribute greatly to economy, safety, and manœuvring power, as well as to mere speed; and seeing that the introduction of triple screws is now no more revolutionary than was the introduction twenty years ago of twin screws, and that it is, upon the whole, quite as likely to be advantageous, it is to be hoped that ere long our own Admiralty will conduct some exhaustive experiments with a view to discovering whether we too ought not to supply some of our battleships with three screws."

Liquid fuel. The question of the suitability of liquid fuel for marine purposes is always with us. It has of late been pressed upon our notice with more than usual urgency. For torpedo-boats its claims to recognition have been especially advertised. It is hardly necessary here to recapitulate the many advantages that would follow the use of oil as a means for generating steam; but for war purposes the noise that, so far, seems inseparable from all plans that have been devised for its combustion, must be sufficient to condemn it. It is, of course, highly probable that this difficulty may be overcome, but, till it is, liquid fuel hardly comes within the range of naval engineering calculations. It is said to have been used with great success by vessels belonging to the Russian Black Sea Fleet; but in our Navy we have at present no knowledge of it.*

Auxiliary engines. A matter of the very utmost importance in a modern fighting ship, which even yet seems hardly to have received all the attention it deserves, is that all the auxiliary engines shall be of the best possible design and workmanship. They frequently give far more trouble to keep in order than the main engines, although things have much improved of late years since the objectionable practice of sub-letting the contracts for them has been largely given up by the

* The Italian Navy has devoted considerable attention to this subject.—Ed.

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best firms. A very trifling defect in one of them is sufficient to stop the ship. How many trials have been brought to nought through the failure of a feed or a fan engine? When, during the naval manœuvres or while a squadron is exercising at fleet evolutions, a ship hoists the signal, "Not under control," it is generally followed by, "Steam steering-gear broken down." The man who shall invent a system of steam steering that should be as trustworthy as, say, the propelling engines of an average man-of-war will deserve well of his country. At present no such system exists. In The *Times* of February 22, in an account of the run of the Sybille from the Tyne to Devonport, we read, "The steam steering-gear worked badly, and ultimately broke down when off the Start." In various papers of the following day it was stated that, "The Peninsular and Oriental steamer Carthage experienced very bad weather on her voyage from Gibraltar, and in the Channel on Monday night her steam steering-gear broke down, and a collision was narrowly averted." When we consider that in the Sans Pareil there are no fewer than fifty-eight auxiliary steam engines on board, and that of these there are some whose failure would mean the disabling for an uncertain period of the ship herself, it cannot be wrong to urge that the utmost care should be exercised by the inspecting officers to see, according to their lights, that these small engines are as scientifically constructed and as accurately fitted in place as are the large ones. There is no direction in which ingenuity could be more profitably applied than in devising small engines for use on board ship that shall, practically, never break down; and the first step towards success is to recognise that the cause of nine out of ten breakdowns is flimsiness.

Defective steering-gear.

The failure of boilers to answer their requirements, indeed, their total collapse when called upon to supply a power of which they were believed to be more than capable, has been, of necessity, the most important naval engineering event of late years. The history of the first introduction into the Navy of boilers so unscientifically designed that the best workmanship in the world could not render them efficient steam generators, can hardly be given here; but a few hints as to the causes of failure will certainly not be out of place. The great grievance with modern boilers has been the copious leaking of the tubes when any full pressure had been asked for, and more especially if anything approaching forced draught had been applied. It is more than probable that one of the first causes of leaky tubes is the inordinate thickness of the usual tube-plate. The thicker it is the more certain are the tubes to leak, on account of the

Causes of failure of recent boilers.

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difference of temperature on the two sides of the tube-plate. This evil would be wonderfully lessened if copper were used, instead of iron or steel, as the material for tube-plates. Its superior conductivity is such that a copper tube-plate 1 in. thick would not strain a set of boiler-tubes so much from variations of temperature as a steel plate of less than one-third that thickness. Locomotive practice is, of course, different from marine, but it may be worth recording that the custom in the United States is never to exceed $\frac{7}{16}$ in. thickness in a steel tube-plate, and that one of the most eminent American engineers, when asked what would he think of a tube-plate $\frac{3}{4}$ in. thick, declared at once that it would be impossible to keep the tubes tight. Another cause of leaks in boilers, less obvious to inquiry, arises from the perpendicular stays being injudiciously placed. In a boiler pressed to 170 lbs. on the square inch rigidity is a frightful mistake; only by allowing a fair amount of elasticity can efficiency, and even safety, be secured. No external strain should ever be brought to bear on a tube-plate, which has of necessity been weakened by its many perforations. In the double-ended common-combustion chamber type of boiler, which has proved so unsatisfactory in the Navy, the evils due to difference of temperature are of course exaggerated, owing to the cold air, admitted perhaps by unskilled stoking, having more opportunity of striking the tube-plates. Another thing; engineers, whether manufacturing or sea-going, cannot too soon become convinced that the boiler is now the most delicate and important part of the marine engine. The tubes require to be fitted into their plate with at least as much accuracy as a cross-head to its guides. The ends of iron or steel tubes are now generally ground bright, so as to ensure "metal and metal" when they are fitted in place. But this is not enough; the ends ought to be steeped in a strong bath of soda, or else the film of grease upon them will prevent true contact. Conical tube-expanders, again, are an illogical abomination; good enough, perhaps, for 20 lbs. on the square inch, worse than useless for 200 lbs. It does not require an expert to see that the tube expanded by a conical mandril will only grip the tube-plate for a small portion of that tube-plate's thickness, and yet we go on using the unscientific tool every day.

Improper position of stays.

Accurate workmanship necessary.

Supply of fresh water.

A constant supply of perfectly fresh water is now absolutely essential to the welfare of all modern marine engines. This, of course, has long been recognised, but only recently has an apparatus, which appears to be superior to any of its fellows, been experimented with by the Admiralty. This is the Yaryan, of American origin, which was tried in Portsmouth Dockyard last December with

Yaryan distilling apparatus.

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most successful results. The main principles of the invention are that the sea water to be distilled is pulverised into spray before it reaches the evaporator, and that there are never more than, say, half a dozen pounds of water in the machine. At Portsmouth over 25 per cent. above the guaranteed output was obtained, and up to the very end of the twelve days' trial there was no diminution. A large installation on this principle is shortly to be fitted to one of the new ironclads, and a tiny one for use in torpedo-boats is to be tried. The weight of the whole apparatus is barely half that of other systems for the same output. The importance of the subject may be gathered from the fact that from eight to ten tons of fresh water are required per 1000 indicated horse-power every twenty-four hours to make up for the inevitable waste while steaming. Were sea water to be used to any appreciable extent, modern boilers would soon become hopelessly crippled.

Engines for abroad.

A great deal of marine engineering work has either been completed during the past year or is still in hand for foreign Powers. Messrs. Humphrys and Tennant have arranged with Sir W. G. Armstrong & Co. to supply twin-screw vertical triple-expansion engines of 15,000 horse-power to the fast cruiser about to be built for the Japanese Government. This ship is to be of only 3600 tons displacement, and is intended to realise 24 knots on the measured mile. Her engines will be on the same plan as those of the Piemonte and the 25 de Mayo, with one high-pressure, one intermediate, and two low-pressure cylinders to each set. This arrangement of four cylinders allows of a great saving in weight and space. The same firm have also concluded highly important contracts for several new warships for the Russian Government. Messrs. Maudslay have just completed the 16,000 horse-power engines of the Russian ironclad George the Victorious, now building at Sebastopol. The cylinders, contrary to the usual practice of the firm, are supported on cast-iron A frames at the back, with turned-steel columns in front, and are 47, 68, and 100 in. in diameter. There are sixteen single-ended boilers, with forty-eight furnaces, pressed to 150 lbs. per square inch. But nothing is more remarkable of late years than the progress made by foreign nations in the way of building marine engines for themselves. More especially is this the case with Italy and Spain. Messrs. Ansaldo & Co., of the Sampierredarena Works, Genoa, who stand certainly first in Italy as an engineering and shipbuilding firm, have just completed engines of 20,000 horse-power for the ironclad Sicilia. They are from designs furnished by Messrs. Maudslay, who have rendered similar assistance to the

Japan.

Russia.

Italy.

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Spain.

Maquinista Terrestre y Maritima of Barcelona, which company is pre-eminently the most important engineering firm in Spain, and, after being in existence for half a century, can fairly compare in amount and quality of work done with some of the best English establishments. Engines are nearly ready now for the Alfonso XIII. and the Lepanto, both 11,000 horse-power, and two sets of machinery for unarmoured cruisers of 15,000 horse-power, besides some for gunboats and topedo-catchers.

Mercantile marine.

C. P. R. steamers.

The mercantile marine has not been standing still—it never does. Perhaps as late and favourable example as any of modern practice for ocean work is the machinery of the Canadian Pacific Railway Company's steamers, which run between Vancouver, Yokohama, and Hong Kong. These ships have twin screws, an arrangement that is slowly but surely making its way into the merchant service. The engines are, of course, triple-expansion, with cylinders of 32, 51, and 82 in. diameter. The cylinders are quite separate from one another, except in the matter of steam-pipes. Between the two sets of engines is a water-tight bulkhead dividing the engine space into two parts, which are in duplicate in all respects. There are four double-ended boilers, with eight furnaces apiece, pressed to 160 lbs., and having a total heating surface of 120,000 square feet. It is noteworthy that these are probably the heaviest boilers ever built, as each weighs over 85 tons, with every possible mounting removed. The boilers are intended to work under ordinary circumstances with natural draught only, but they are fitted with forced draught appliances. On trial over a 500 miles' course the following results were obtained :—

	Natural Draught.	Forced Draught.
Revolutions	81	89
I.H.P.	7,650	10,100
Speed	17·25 knots	18·90 knots.
Consumption per day	130 tons	Not ascertained.

R. C. OLDKNOW.

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CHAPTER VII.

The Royal Naval Exhibition.

A record of the Naval History of 1891 would be incomplete without some reference to the Royal Naval Exhibition opened on May 2, in the grounds of the Royal Hospital, Chelsea. Under the direct patronage of Her Majesty the Queen, with His Royal Highness the Prince of Wales as its President, and with a Committee including all the most distinguished naval officers in the service, the Exhibition possessed from its outset all the characteristics of a national undertaking.

The fact that the whole of the profits without exception were devoted to a public object, and that the services of the various committees were honorary in every case, tended still further to remove the enterprise from the list of private speculations. That object to which the profits of the Exhibition were devoted is so closely connected with the welfare of the Royal Navy that it deserves to be clearly set out here. It is defined in the following extract from the address presented on the occasion of the opening of the Exhibition to His Royal Highness the Prince of Wales.

Disposal of profits of Exhibition.

"It has been decided that any surplus available at the close of the Exhibition should be devoted to form the nucleus of a Fund to supplement the Government assistance given to the widows, or those dependent upon Seamen and Marines who may lose their lives in the Naval Service of their country.

"A catastrophe occurring near England, or on a large scale, involving the loss of a whole ship's company, appeals strongly to public sympathy, and money is readily raised; but there are many cases on distant stations, equally distressing, that are but little heard of, and it is to relieve these that we hope to start a substantial fund as the result of this Exhibition."

From the success which had attended the Military Exhibition held in the same place in the previous year, it seemed reasonable to anticipate that a large number of persons would visit the Exhibition. As a matter of fact, however, the number of visitors far exceeded the highest estimate that had been formed. During the 151 days for

Number of visitors.

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which the Exhibition was open, no less than 2,351,683 persons passed the turnstiles. There could scarcely be a greater proof of the warm interest which is always shown by the British public in everything that concerns the Royal Navy.

So great was the success of the Exhibition that not only were all expenses provided for, but a considerable surplus* has remained in the hands of the Executive Committee to be applied to the charitable purposes already referred to. It is, however, satisfactory to note that, prior to the opening of the Exhibition, and when its success was a matter of speculation only, a sum of £53,000 was guaranteed by gentlemen interested in the undertaking in all parts of the United Kingdom.

It was the aim of the Committee to present a complete chronological series of exhibits, which should enable the public to follow the development of the Navy from its earliest existence as an organised service. Owing to the activity of the various sub-committees, and to the great assistance received from the Admiralty, from the Governors of Greenwich Hospital, from various other public bodies, and from a large number of private contributors, it was possible to achieve a very large measure of success in the direction hoped for. It is not proposed to deal here with the purely historical aspects of the collections exhibited. An annual record is concerned rather with the progress, and the novelties of the year.

From the nature of the case it was essential that the greater part of the exhibits in the Ordnance, Models, and Electric Lighting Galleries, should have been already described in previous numbers of the *Annual*. There were, however, features in all of these sections which may well be mentioned here.

The Ordnance Gallery.

The exhibit in the Ordnance Gallery was complete and interesting, and was supplemented by a most striking collection of guns, gun-mountings, models, and other appliances shown by the Elswick Company, in a separate and specially constructed annexe. A very complete historical series of naval guns was shown in the St. Vincent Gallery. This included heavy guns of all designs, from the reign of Henry VIII. down to the present time. The size of the 30-pounder guns carried by the ships of war of the early part of the sixteenth century was very remarkable, as this weight of shot was practically not exceeded till the beginning of the present century, and was greater than that of the large majority of the projectiles used at Trafalgar and the other battles of the great naval war.

Bollard of H.M.S. Inflexible.

An object not unfamiliar to naval officers was exhibited in the same gallery, and is worthy of notice as furnishing a striking object-

* The exact amount has not yet been announced.

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lesson to the British public. The exhibit referred to is the bollard of H.M.S. Inflexible, struck by a projectile fired from a 9-in. Armstrong gun mounted in one of the forts of Alexandria. The shot having entered the ship was deflected, struck the bollard with its base, and leaving an imprint of the word Palliser sharply cut in the metal, continued its course and killed an officer and warrant-officer on the deck above. Having come to rest, it was captured, and was exhibited with the bollard.

The incident forms a somewhat cynical commentary upon the readiness with which this country supplies weapons to its possible enemies. That an English shot fired from an English gun by the enemies of England should have struck an English ship, and after killing two Englishmen should have been found to have left its mark in good English upon the vessel which it struck, is a singularly complete record.

Modern guns.

A complete series of modern naval guns and projectiles was included in the ordnance collection. A 6-pounder and a 4·7 quick-firing gun fitted with Morris tubes were put at the disposal of visitors for practice in firing at a moving object. Among the quick-firing guns was included a 14-pounder, a type of gun which has not hitherto been adopted in the service, but which will probably ere long be represented by a 12-pounder or 16-pounder in the bows of torpedo catchers. A 14-pounder and a 3-pounder gun on the Maxim automatic recoil system were also exhibited. Great interest was created by Messrs. Armstrong's full-size model of the 110-ton gun, and by the remarkable diagram by which it was accompanied, showing in a graphic form the penetration of the projectile. Professional visitors were, however, probably more interested in the new 22-ton (9·2-in.) gun, which was shown mounted and fitted complete for service. This exceedingly powerful weapon has been selected as the largest naval gun capable of being man-handled, and is being largely adopted for use in new ships, and in some of the old ironclads which are being refitted.

Steel and iron forgings.

In that part of the Ordnance Section devoted to steel and iron forgings, armour-plates, armour-piercing shells, &c., were a variety of interesting objects, few of which, however, were absolutely new. The compound armour-plates for the Royal Sovereign and her sister-ships were magnificent examples of their kind; and the display of forged steel, especially by Messrs. Whitworth, was remarkable. Amongst the exhibits of this company a weldless boiler shell 12 ft. in diameter, 5 ft. wide, and ¾ in. thick, forged out of a single ingot, was especially noteworthy.

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Armour

Examples were shown of nickel-steel armour, a most interesting material, which seems likely to be very largely adopted for use in the construction of men-of-war both here and in the United States. A sample of one of the new armoured gun-ports for the broadside guns of ships of the Royal Sovereign class attracted much attention. The design gives far greater protection than has ever hitherto been obtained for guns mounted in the same position on earlier ships.

One of the steel connecting rods taken from the engines of the City of Paris after the catastrophe which befell her in the mid-Atlantic presented a most extraordinary appearance; the contortion of the solid steel forging gave a striking idea of the forces which are at work in the engine-room. The rod was twisted and battered as if it had been made of no stronger material than cast iron or pewter.

The Models Gallery.

The display in the Models Gallery was singularly complete and effective, as in some form or another almost every type of vessel built for the Navy during the whole period of its existence was represented either by drawing section, half or whole model.

Special interest attached to the models of vessels contained in the new building programme. An excellent opportunity was given of comparing the structure of the Hood and Royal Sovereign respectively. A number of models of the new type of second-class cruiser were sent by the various private firms to which their construction has been largely entrusted. An admirable model of the Blenheim was shown by the Thames Ironworks Company, while a magnificent half-model of the Victoria, on a scale of 1 in. to the foot, was included in the Elswick exhibit.

In order to give an idea of the relative sizes of the various types of vessels, and to indicate the distribution of our naval forces, a series of models of all ships in the Navy, building, built, and in commission, was prepared. These models, which were on a uniform scale of $\frac{1}{48}$ in. to a foot, were arranged in accordance with the stations which they at present occupy. The most noticeable point in the collection was the immense length of the selected mercantile cruisers, Umbria, Majestic, City of Paris, and Empress of India, as compared with the largest and most powerful ironclads in the service.

Model of engines H.M.S. Blake.

Among the models of engines was one of the engines of H.M.S. Blake, exhibited by Messrs. Hawthorn, Leslie & Co., which was remarkable as being an example of the first set of engines supplied to the Royal Navy, containing four separate sets of triple-expansion engines, with a total of twelve pistons, six on each of the two screw shafts. In addition to the very high power which these

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engines are capable of developing when properly supplied with steam, they have the convenience of being capable of disconnection while at sea. The two forward engines can be thrown out of gear, and the ship propelled by the two after sets, or, in case of emergency, by one of the after engines only. Another advantage attaching to this class of engine is the absence of vibration when steaming, the six cranks on either shaft dividing the throw of the pistons and almost eliminating the shock which follows the stroke of a single piston.

The most prominent feature of the Exhibition was the full-sized model of H.M.S. Victory, erected from the water-line upwards, and with a hollow excavated under a portion of the hull to contain a representation of the cock-pit below the water-line. The greatest possible pains were taken to exactly reproduce the ship, both in its external features and internal fittings, exactly as she went into action at Trafalgar. As a result, the model in several respects gave a more accurate idea of Lord Nelson's flag-ship than the actual Victory which now lies at Portsmouth, and which has undergone many important alterations since 1805. The restoration of the stern after the original pattern was particularly noticeable. The Victory model.

The exhibition which daily took place upon the lake in the grounds proved exceedingly attractive to the public, but presented few features of novelty or instruction to naval students. The miniature displays of mining and counter-mining, observation and contact torpedoes are familiar to all naval men, but the successful use of the electrically controlled boat is worth recording. The manœuvres and encounters of miniature ironclads upon the artificial waters, though conducted with great skill and ingenuity, were of no special interest from the naval point of view. Displays on lake.

The electric lighting of the Exhibition was carried out very effectively, the apparatus being throughout of a character suitable for use in the Navy. Three dynamos were used by Messrs. Siemens, one of 180 kilowatts, one of 24 kilowatts, and one of 48 kilowatts. Three engines, of 300 indicated horse-power, of 80 indicated horse-power and of 60 indicated horse-power respectively, supplied the current. The electric light installation.

The most remarkable feature in the installation was the electric light produced at the top of the model of the Eddystone Lighthouse, which was erected in the grounds. This light was similar in design to that used at St. Catherine's Lighthouse, and was made on a pattern furnished by the Trinity House. Fluted carbons designed by Sir Jas. N. Douglas, F.R.S., were used. The current was an alternating current of 250 to 40 ampères at a pressure of 55 to 60 volts. The Eddystone Lighthouse.

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electric energy absorbed in the arc was therefore from 20 to 30 horse-power, and the light produced was equal to about 40,000 candles. This light was brought to a focus in the lenses and intensified so as to give an illuminating power equal to 3,000,000 candles, thus placing the light fourth among the electric lights of the world.

Experiments with fog.

Interesting experiments were made with this powerful beam from time to time. The misty air of London was particularly favourable to observations of the effect of a beam of high illuminating power upon fog, mist and cloud. The experiments made revived the idea, which had previously found expression in several quarters, of the value of a vertically projected beam in indicating the position of a lighthouse or signal station when the atmospheric conditions were unfavourable to the passage of the horizontal rays. The clearness with which the vertical beam was visible from great distances on nights when low-lying mist or fog wholly or partially obscured the lantern itself was most remarkable.

There can be little doubt that advantage will be taken ere long to make a series of practical experiments at some of the lighthouses along our coasts of the value of the vertical beam. It is contended, apparently with much reason, that the recent unfortunate stranding of the German mail steamer Eider might have been avoided had the vertical beam been employed at the St. Catherine's Point Lighthouse. Some people have asserted that in the clear atmosphere often prevailing near the sea-coast, the illuminating power of the beam would be dissipated. But the argument does not seem conclusive, inasmuch as on clear nights the horizontal beam would always be plainly visible.

The Navigation Gallery.

The collections contained in the gallery devoted to Navigation were complete and interesting; but it can hardly be said that anything essentially new was exhibited. The models of lighthouses sent by the Trinity House gave an excellent idea of the vast progress which has been made in the art of lighthouse construction and lighting since the date of the erection of the first Eddystone Lighthouse in 1694.

Chronometers.

The Greenwich collection of chronometers and chronometer balances formed a most useful historical record. The chronometer made by Mr. John Harrison in 1759, which obtained the prize of £20,000 offered by the Government to the first inventor of a means of discovering longitude at sea, was shown, together with the duplicate made by Kendall, apprentice to Harrison. The successful construction of a second chronometer by another maker was a condition precedent to the award of the Government prize.

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A most interesting series of chronometer balances of various kinds was also shown. The variety of devices resorted to for effecting the required compensation is most remarkable. It included a glass spiral spring, and a mercurial balance in which the expansion and contraction of mercury in a pair of curved glass tubes was employed.

Exercises by blue-jackets and Marines.

The entertainments provided were primarily intended to attract the public and to add to the popularity of the Exhibition, and in so far as they merely answered these requirements they do not call for special description here.

The exhibitions of field-gun, small-arm, and cutlass drill by selected squads of blue-jackets from H.M.S. Excellent and Cambridge, and by parties of the Royal Marines from the depôt at Walmer, come under another category. There can be no doubt that the extreme precision of the exercises, the admirable discipline, and the stalwart and smart appearance of the men, produced a most favourable impression upon the many thousands of spectators who filled the seats surrounding the arena. The popularity of the naval service, always great, was undoubtedly enhanced by these displays. Londoners, and, indeed, civilians from all parts of the empire, saw for the first time how admirable is the material which our present system of naval training has produced. The promoters of the Exhibition declared it to be one of their objects to "bring the navy of the past, and the navy of the present, home to the inland people of our country, who never have the opportunity of visiting the seaports and dockyards," and unquestionably in this respect their expectations were fully realised. A practical test of the effect on the public mind was furnished by the great increase in the applications for admission into the Royal Navy during and since the Exhibition, and it can hardly be doubted that the tax-payers, always generous in supplying money for the service, received an additional motive for continuing their wise liberality in the future.

The drill of blue-jackets and Marines was witnessed by H.M. the Queen, by the German Emperor, and by a large number of foreign officers, notably by the cadets of the French training-ship, the Bougainville, who attended the Exhibition in a body on the invitation of the Committee. The performance of both elicited the warmest praise from all those professional critics whose experience gave value to their judgment. The fact, however, that the detachments from the Excellent and Cambridge were furnished with so old-fashioned a weapon as the 9-pounder muzzle-loading gun excited some surprise among foreign officers.

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Royal Marines.

The drill exhibition afforded by the Royal Marines calls for special remark. The good physique and appearance of the men, their discipline, and the precision of their movements, excited the most favourable comment. Military officers who witnessed the drill, while readily expressing their admiration of its perfection, were heard to remark that the result was not surprising in a corps composed of twelve years' service men. It was, however, pointed out—and the fact is most noteworthy—that every man in the three squads of Royal Marines who attended the Exhibition was a recruit of less than eight months' service. The fact that recruits of such good physique should be procured, and should in so short a time attain so high a degree of efficiency, is a striking testimony to the excellence of the system adopted in the Royal Marine depôt at Walmer and to the diligence and intelligence of the staff of that establishment.

Further details as to many interesting exhibits contained in the Exhibition would be out of place here. A complete record will be found in the 5th edition of the comprehensive catalogue issued by the Committee and published by Messrs. W. P. Griffith & Sons, Limited, London.

The success of the Exhibition was complete in every respect. Admiral Sir William Dowell, K.C.B., and Admiral Sir W. H. Stewart, G.C.B., as Chairman and Vice-Chairman respectively of the Executive Committee, gave an example of energy, good judgment, and business faculty which was emulated by the members of the various committees who undertook and carried out the work of the Exhibition. Captain Jephson, R.N., was indefatigable in the performance of his duties as Secretary, and at the close of the Exhibition received the compliment of knighthood for his services.

There can be no doubt that the enterprise throughout was conducted in a way that did credit to the Royal Navy, and that, in the words of the First Lord of the Admiralty, "To many thousands of our countrymen it was the cause of renewed interest in the Navy, whereon, under the good providence of God, the wealth, safety, and strength of the kingdom chiefly depend."

H. O. Arnold-Forster.

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CHAPTER VIII.

The Naval Episodes of the Chilian Civil War.

This is not the place in which to inquire into the causes of the Civil War which disturbed Chile between January and August, 1891, nor is it necessary here to follow all the events of the struggle. It is purposed in the present chapter to describe merely its naval aspects in the light of the official despatches of the Chilian officers on both sides, and of the notes most kindly furnished to the writer by British officers who were eye-witnesses of some of its leading incidents, and especially by Captain A. F. St. Clair, R.N., late of H.M.S. Champion, and to call attention to any useful lessons that it seems possible to derive from them.

I. The Blanco Encalada and the Forts.

The revolt of the Congressional Party against the Government of President Balmaceda assumed an actively hostile form on January 7th. On January 6th there were lying in Valparaiso Bay, in addition to the British third-class cruiser Champion, Captain A. F. St. Clair, the Chilian warships Blanco Encalada, Esmeralda, O'Higgins, and Magellanes, all in commission. The Huascar was also there, but not in commission; and the Almirante Cochrane, in commission, lay in Quinteros Bay, about eighteen miles to the northward. During the night of the 6th all the Chilian war vessels in commission put to sea; and, having been joined by the Almirante Cochrane, returned on the afternoon of the 7th. For some time they steamed backwards and forwards, and then, as no notice was taken of them by the Valparaiso forts, they manned and armed their boats and, without resistance, took possession of the Huascar, which they towed across to the north-east part of the bay. They there put her machinery into working order, and, having completed their labours by the 10th, they manned her, and she joined the rest of the Congressionalist Squadron.

In the meantime, on the 6th, the seceding members of Congress had drawn up a manifesto, which, signed by Señor Waldo Silva, Vice-

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Chilian Civil War.

Naval Forces Employed by the Belligerents.

Nature of Vessel.	Name of Vessel.	Tonnage.	Horse-power.	Sea Speed (knots).	Armament.
	Congressionalist.				
Central Battery Battleships	Blanco Encalada	3450	3000	11·0	6 8-in. B., 4 light, 7 M., 2 T.
	Alm. Cochrane	3370	2920	11·0	6 8-in. B., 4 light, 7 M., 2 T.
Ironclad Turret-ship.	Huascar	1130	1200	10·0	2 10-in. B., 2 40-pdr. B., 2 light.
Protected Cruiser	Esmeralda	2810	6500	15·5	2 10-in. B., 6 6-in. B., 2 Q.F., 9 M., 3 T.
Wooden Corvette	O'Higgins	1670	1100	9·0	3 7-in. B., 4 40-pdr. B.
Composite Corvette.	Abtao	1050	1000	8·0	1 70-pdr. B., 4 40-pdr. B.
" "	Magellanes	772	1230	10·5	1 7-in. B., 1 64-pdr. M., 3 20-pdr. B.
Armed transports, chiefly merchant vessels belonging to the Compañia Sud Americana de Vapores, and the Compañia Esplotadora de Lota & Coronel.	Aconcagua	4112 (gross)	N. 600	12·0	2 5·1-in., 1 40-pdr., 2 Q.F., 4 M.
	Cachapoal	2160 (gross)	N. 400	13·0	1 6-in., 2 7-pdr., 2 40-pdr., 2 2·24-in. Q.F., 2 M.
	Maipo	2295 (gross)	N. 280	11·5	Light and machine guns.
	Amazonas	1970 (gross)	2400	12·5	Light and machine guns.
	Dithmarschen	960 (gross)	N. 150	12·0	Light and machine guns.
	Isidora de Cousino	597 (gross)	N. 90	11·0	Light and machine guns.
	Biobio	743 (gross)	?	10·5	Light and machine guns. Spar torpedoes.
	Valparaiso	?	?	8·0	Light and machine guns. Spar torpedoes.
	Copiapo	1337 (gross)	N. 180	10·0	Light and machine guns.
	Cachapoaleto	?	?	..	Light and machine guns. Spar torpedoes.
	Tolten	420	270	8·5	Light and machine guns.
	Itata	1766 (gross)	N. 340	12·0	Light and machine guns.
	Bismarck	?	?	?	Light and machine guns.
	Limari	967 (gross)	N. 150	12·0	Light and machine guns.
	Carlos Roberto	644 (gross)	N. 81	10·0	Light and machine guns.
And the small craft Maule, Truinao, Minero, Miraflores, Condor, and Huemul, which were chiefly used as tugs.					
	Balmacedist.				
Torpedo Gun-vessels	Alm. Lynch	750	4500	19·0	3 3-in. 14-pdr. Q.F., 4 1·85-in. 3-pdr. do., 2 M., 5 T.
	Alm. Condell	750	4500	19·0	3 3-in. 14-pdr. Q.F., 4 1·85-in. 3-pdr. do., 2 M., 5 T.
Torpedo-boats	Sargente Aldea	70	700	18·5	Spar torpedoes.
	Guale	90	400	18·0	Spar torpedoes.
Armed Merchantman.	Imperial	2362 (gross)	3000	14·0	1 6-in. B., 4 light, 4 M.
	And one or two torpedo-boats similar to the Guale.				

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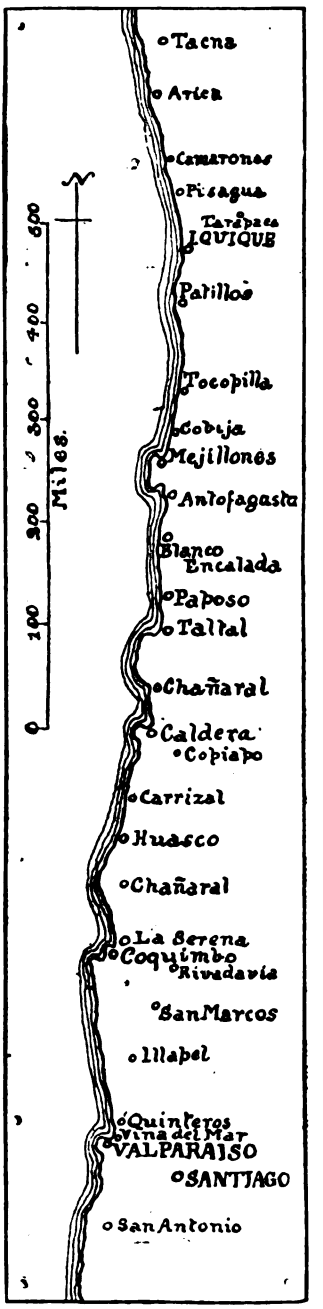
President of the Senate, and Señor Ramon Barros Luco, President of the Chamber of Deputies, was published on the 7th as a supplement to the daily paper *El Heraldo*. With this was circulated the formal acceptance by Captain Don Jorge Montt of the command of the Congressional flotilla. Soon afterwards Señores Waldo Silva, Barros Luco, and Errázuriz, the deputy for Valparaiso, embarked on board the Blanco Encalada, and Captain Montt hoisted a broad pennant as commodore commanding-in-chief.



The first work of the Squadron was to take possession of all the steamers of the Compañia Sud Americana de Vapores, with the exception of the Imperial and the Maipo, which were then laid up. It also seized every other steamer that flew the Chilian flag, and thus obtained complete control of the bay. The Government troops, however, held the shore, and posted pickets behind sandbag entrenchments at intervals along the sea-wall. On the 9th, for the first time these pickets opened fire upon a small boat which was endeavouring to escape from the shore to the ships, whereupon the Blanco Encalada and the O'Higgins replied from machine-guns in their tops, and dispersed a body of cavalry which was patrolling the road on the south-west side of the bay. From that date, until the last of the Squadron departed on the 16th, firing between the troops on the sea-wall and the picket-boats of the ships was of daily occurrence. During this period the boats of H.M.S. Champion kept up communication with the shore during daylight, and, at the request of the Intendente, landed any mails that arrived. The boats of merchant ships lying in the bay were also able to land at the Customs Jetty

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from 8 A.M. to 10 A.M. to procure provisions and to communicate with their consuls and agents; but all boats in harbour were required to fly their national colours. The Congressionalist Squadron did not, of course, have dealings with the shore near Valparaiso; but it was well supplied with most necessaries, for it had seized the cargoes of the Chilian steamers, and it obtained fresh meat by sending one or other of its own vessels up the coast for cattle. The Blanco Encalada lay at her accustomed buoy at the end of the line of man-of-war moorings. The Huascar occupied a pair of buoys inside her and abreast of the Custom House Battery. The rest of the ships were outside, occupied either in securing supplies or in raising recruits up and down the coast. Some of them took possession of Coquimbo, but evacuated it again previous to the arrival there of a division of troops which had been sent overland from Santiago. After a few days the Huascar also departed on a mission, leaving the Blanco Encalada as the sole representative in the harbour of the Congressionalist forces. She was thus quite alone, when, at 5 A.M. on January 16th, Forts Valdivia, Bueras, and Andes each fired one round at her. The projectiles from Valdivia and Bueras struck, and she promptly slipped from her buoy and moved in to a position close to the Custom House and floating docks, where she made fast to another buoy. Here her guns commanded the Custom House and Intendencia; yet she was comparatively safe, for the forts could not fire at her without endangering the town and docks. Captain St. Clair, of the Champion, at once lodged a protest with the Intendente, and another with the officer in command of the Blanco Encalada, against any further firing until time should have elapsed sufficient to allow neutral vessels to clear out. No further firing took place. In the afternoon, at the request of Captain Montt, and with the sanction of the Intendente, the boats of the Champion landed the killed and wounded. Captain Montt gave notice of the immediate blockade of the port of Valparaiso; but upon Captain St. Clair pointing out that the Congressionalist Squadron could not exercise belligerent rights with regard to foreign vessels, and that, as the Congressionalists had no admiralty courts in which to try vessels, they could not be permitted to capture them, Captain Montt engaged that foreign vessels should not be molested, apart from the prevention of the importation of contraband of war. In the evening, after dark, the Blanco Encalada put to sea, taking with her all the small tugs and steam vessels that had been seized.

A British officer who was an eye-witness of the firing on January 16th, and who, a few hours afterwards, visited the Blanco Encalada, thus describes the effect of the two projectiles.

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"The Blanco Encalada, lying at her buoy, was about 600 yards distant from Fort Bueras, which was on her starboard beam at a height of about 150 feet above the sea. The gun fired from Fort Bueras was a 10-in. M.L.R. Armstrong of 20 tons' weight, loaded with 130 lbs. of pebble powder and a filled common shell weighing 450 lbs., and fitted with a Krupp 'time and percussion fuze.' The shell struck the starboard side of the battery between the second and third guns, exactly upon the head of one of the through bolts securing the armour, which is there eight inches thick. The shell burst outside, and left its head embedded in the plate, but drove the bolt completely through the side. The bolt struck the training wheel of an 8-in. gun, disabling the weapon, and, glancing upwards, made a large indentation in the deck overhead. It then fell to the deck on the port side of the battery, and was there found. The bursting shell badly burnt the paint on the ship's side, and the woodwork of the adjoining ports; but did no further harm.

Shot from Fort Bueras.

"From Fort Valdivia the Blanco Encalada was distant 1200 yards, the fort being astern and at a height of about 100 feet above the sea. The gun fired was a 21-cm. (8·2-in.) Krupp of about 10 tons, loaded with 100 lbs. of brown prismatic powder and a Palliser sand-weighted shell of 250 lbs. This shell struck the stern above the armoured belt, traversed a ¾-in. plate, passed through the captain's cabin and out of the door, demolished a 7-in. pump, struck the deck obliquely, rose again, and grazed the coamings of the wardroom hatchway, splinters from which broke a mirror and did other damage in the mess-room. From the coamings it passed through a 1-in. wooden bulkhead, and struck the 5-in. steel bulkhead that protected the battery from fire from astern. In that it punched a hole an inch and a half deep, and then broke into numerous fragments. The dimensions of the compartment between the wooden and the steel bulkhead were about 25 feet by 43 feet, and within this space all the casualties occurred. Six people were killed, and six (three mortally) wounded. There were at least forty men sleeping in the compartment at the time, some on the deck and some in hammocks. Three men in the line of the shell's flight were killed, the one next to the wooden bulkhead being mutilated beyond recognition. The other three killed were in hammocks close by. The men wounded were hit by pieces of the shell which flew in all directions. Strange to say, in its passage through the captain's cabin, the projectile took the pillow from under the head of Señor Waldo Silva, who was sleeping there, but did not injure him in the slighest degree. The projectile from Fort Andes missed, striking the water some yards astern."

Shot from Fort Valdivia.

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II. The Attempt on the Imperial.

For about a fortnight after the evacuation of the harbour of Valparaiso, the Blanco Encalada and the O'Higgins watched the port, stopping and boarding all vessels that entered or left it, but only interfering with foreign trade to the extent of sending to Coquimbo certain vessels that were laden with coal intended for Valparaiso.

Naval force organised by Balmacedists.

The harbour being thus relieved from the immediate presence of the Congressionalist ships, the Government began to organise some kind of naval force. It got ready and launched several torpedo-boats which had been laid up at the torpedo-depôt and brought them round into the bay. The slip is situated outside the bay and just to the southward of the lighthouse, and it had been somewhat damaged by shell-fire from the O'Higgins; but little difficulty was experienced in repairing it and in getting the boats into the water. The Compañia Sud Americana's large steamer Imperial was also chartered, and was fitted as an armed transport. She had the reputation of being the fastest vessel on the coast, and, from the 31st of January, when she started on her first trip, down to the conclusion of the civil war at the end of August, she ran continually, experiencing several narrow escapes, yet invariably managing to get away.

Attempt to torpedo Imperial.

On the night of the 27th of January the Imperial was lying alongside the Customs Mole, when, at 11 P.M., a picket-boat belonging to the Blanco Encalada passed near H.M.S. Champion, which lay hard by, and was observed to have ready a Whitehead and a spar torpedo. Soon afterwards the discharge of the Whitehead was heard on board the British cruiser, and the boat was seen to steam rapidly out again; but no explosion following, she presently returned and endeavoured to approach the Imperial. By this time, however, both the crew of that vessel and the pickets ashore were thoroughly on the alert, and a brisk fire of musketry was opened on the boat, which steamed out once more, and rejoined the Blanco Encalada in the offing.

Next morning the Whitehead was picked up minus its head. It seems to have passed ahead of the Imperial and to have run among the pillars of the Mole, where its head must have been wrenched off either by the effect of a glancing blow on one of them, or by fouling the chain moorings of one of the lighters that lay there. As the Pacific Steam Navigation Company's steamer Britannia was

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alongside the Mole, and only a very little ahead of the Imperial, both ships had a very narrow escape. Thenceforward the Balmacedist torpedo-boats were regularly employed in patrolling the bay at night time. The Guale on one occasion deserted her post and endeavoured to get away to the northward in order to join the Congressionalists; but, running short of coal, she was recaptured by the Almirante Lynch, which next morning was sent in pursuit of her. This was in the second week of May. The crew, or at least those of them who were taken, were carried back to Valparaiso, tried by court-martial, and shot. In mentioning this episode, I am dealing with events somewhat out of their due order; but matters at Valparaiso, during the days when that place was the head-quarters of the Balmacedist Navy, may as well be summarised together, and, therefore, to the incident of the Guale I will here add, in brief, two other facts. On the night of the 8th of March the steamer Maipo, which had been chartered from the Compañia Sud Americana and fitted by the Government of the President as an armed transport, was lying at a buoy, ready for her first trip, when she was seized by her officers and crew, who carried the vessel, with some artillery officers and deserters who were on board, to join the Congressionalists at Iquique. On the 21st of March the new torpedo gun-vessels Almirante Lynch and Almirante Condell arrived at Valparaiso from Europe, and thus materially increased the Balmacedist strength; but their boilers and engines were so much out of repair that it was not until after the middle of April that they were ready for sea again. Nearly all their boiler tubes had to be renewed.

III. Operations in the North.

Iquique was one of the first places to which the Congressional Fleet paid attention after it quitted Valparaiso. Just before the middle of January the Almirante Cochrane and the Magellanes made their first appearance there. The Intendente refused to surrender the town, but its only seaward defences being three old forts, one on an island, one near the railway station, and one near the Morro, all armed with obsolete and nearly useless guns, it was at the mercy of the fleet, which did not at once occupy it simply and solely because men could not be provided for the purpose. To induce the Intendente to alter his mind, threats of bombardment were made; but on January the 17th, at a meeting which was held on board H.M.S. Pheasant, it was made clear that he would not give up the town, and on the 20th a strict blockade was begun. Even then, however, it was

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not generally believed that the Intendente would go beyond passive resistance, until, on the 22nd, it appeared that troops had been sent to attack the Congressionalists, who were advancing overland from Pisagua, and that they had met and fought them. Upon this, the Cochrane sent ashore to say that if any further trains left the town they would be fired upon, and in the evening she shifted her berth so as to be able to give effect to her threat. On the 27th news arrived that Pisagua had been recaptured by the Balmacedists, and the event was celebrated in Iquique by a musical demonstration, which provoked the Cochrane into ordering from their anchorage all vessels that interfered with her line of fire upon the town.

Capture of Iquique by Congressionalists.

At about this time the Congressionalists, who had previously occupied Coquimbo and Serena, abandoned those places and began to concentrate upon the northern province of Tarapaca. Transports, with troops from the evacuated towns, arrived at Iquique, and the Blanco Encalada and O'Higgins followed on the 2nd of February. The Cochrane proceeded to Pisagua on the 4th, and retook it on the 6th, while on the afternoon of the 4th the Blanco opened fire for a short time upon one of the Iquique forts in which attempts were being made to mount a large gun. Yet, for several days matters changed very little, in spite of the fact that, towards the middle of February, Colonel Canto was advancing overland from Pisagua towards Iquique. This move, however, ultimately led the Intendente to send away his troops, and on the 16th of February he surrendered the place, which was at once occupied, though in very insufficient force. In the early morning of the 19th, under cover of a fog, the Balmacedist troops, under Colonel Soto, re-entered the town, the Congressional forces having previously taken refuge in the Custom House, whence they fired on the enemy as he advanced. The Blanco manned her steamboats and sent them in to assist, and also shelled the houses under cover of which the Balmacedists were supposed to be advancing; while the Tolten used her machine-guns to protect the sending of two or three boat-loads of seamen to reinforce the garrison of the Custom House. The men landed, but were driven back. At half-past nine they made another attempt, which was successful. The Esmeralda, which had been lying in Cavancha Bay to assist the Huascar in preventing Colonel Soto's artillery from following him into Iquique, joined the Blanco Encalada soon after ten, and added to the cannonade. In the afternoon more reinforcements were sent to the Custom House; the bombardment, which had slackened for more than an hour, was violently renewed, and directed especially upon some buildings to the right of the

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Custom House. At half-past three a store of dynamite blew up and fired the town. Not long afterwards, to the general relief, Rear-Admiral Hotham, whose flagship, the Warspite, lay close to the Blanco, managed to arrange an armistice to last until noon on the 20th. In conducting the necessary negotiations, Captain the Hon. Hedworth Lambton willingly and coolly underwent very great risks, and one bullet actually went through the bottom of the gig that conveyed him ashore, and another through its awning. Next day, at noon, 600 fresh Congressional troops having arrived in the interim, Colonel Soto ended the struggle by giving up the place. What damage was done, beyond the burning of the principal part of the business quarter, is not accurately known.

IV. The Itata Affair.

After the capture of Iquique, the Congressionalists defeated Colonel Robles at Pozo Almonte on the 7th of March, and so gained the whole province of Tarapaca. Later in the month, Antofagasta fell to them, and in April, Arica and Tacna. But, judged by the amount of interest which they excited in Europe, the most important events of this period were those connected with the voyage of the Itata.

Escape and seizure of Itata.

No sooner had Iquique fallen than—here I take the account supplied by a very well-informed correspondent to the *Army and Navy Gazette*—the Congressionalists despatched a representative to purchase arms from America, but instructed him not to telegraph until the arms were ready for shipment. He misinterpreted his orders, telegraphed prematurely, and the Itata, being despatched for the consignment, was kept waiting for some time at San Francisco. The authorities were informed of her objects, and, lest complications might ensue, the arms were shipped in two American schooners, the Robert and the Minnie, for transhipment to the Itata somewhere outside the three-mile limit. The Itata put to sea, but calling for coal at San Diego before the transfer had taken place, was there detained by order from Washington, and a guard, in the person of a United States' marshal, put on board. The Itata, however, slipped her cable early one morning, set the man on shore ten miles down the coast, and got away safely to Iquique, although her captain, who had let his chronometer run down and lost his charts, had to navigate by dead reckoning and a general chart of the coast. The ship arrived on the 3rd of June, and Admiral Brown, whose flag was in the Charleston, at once took possession of her, with 5000 rifles and

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2,000,000 rounds of ammunition. It is believed that these represented only a small part of the total consignment, and that the rest found its way to Iquique in other vessels. The detention at San Diego was ordered on the ground that the Congressionalists were rebels, and the seizure, on the ground that, by steaming away with a United States' officer on board under duress, the Itata had insulted the American flag; but the United States' Supreme Court did not adopt such severe views, and the vessel was returned to her owners upon their giving a bond for 60,000 dollars for the vessels, and one of a like amount for the arms. This happened on the 30th of September. The incident, though not in itself of much moment, had become important, first on account of the exaggerated claims that were made, or supposed to be made, by the American Government, and next because it appeared for a time as if the Congressionalists would resist any attempt to capture the Itata; but in the end the difficulty was arranged with perfect amity, for it was handsomely acknowledged that the Itata's seizure was indefensible.

V. The Sinking of the Blanco Encalada.

The Blanco Encalada, with several transports in company, arrived at Caldera on the 22nd of April, and landed a force, which on the same day went by railway to take possession of Copiapo. This force was under the command of Captain Goñi, of the Blanco Encalada. Copiapo having been occupied, Captain Goñi returned, and proceeded on board his ship at about half-past one in the morning of the 23rd. In his absence no precautions were taken, and no fears of any attack appear to have been entertained. It is asserted that, though Captain Goñi himself was aware that the Condell and Lynch were in his neighbourhood, he believed that no Chilian officer would sink a Chilian armourclad, even if belonging to the other side; but it is almost incredible that this officer can have been so simple-minded. The vessel lay at a buoy in the southern part of the bay, with steam up for moving the engines, and with the ordinary guard of seven men on watch. The armament had been temporarily reduced to provide guns for transports, and consisted at the time, in addition to the heavy guns, of three 6-pr. Q.F. Hotchkiss, disposed one on each side of the forecastle and one on the poop; four 1-in. Nordenfelts, disposed one on each side of the fore bridge, one on the after bridge, and one on the starboard side of the poop; one Hotchkiss revolving cannon in the top; and two ·45-in. machine-guns. Her original

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complement had been 300 well-trained men; but of these only 80 remained on board, the rest having been drafted to other ships, or landed with the naval brigade. The vacancies had been filled up with raw recruits, who had little knowledge of a ship, and less of their duties.

Report of Commander of Condell.

The story of the sinking of the Blanco Encalada, from the point of view of the attack, may be best told in the words of the Official Report of Señor Carlos E. Moraga, commanding the Almirante Condell. He wrote, under date of Valparaiso, 29th of April:—

"I left Valparaiso on the 18th of this month, with the torpedo-vessels Condell and Lynch, and the armed steam transport Imperial. As I deemed it necessary, if we desired to attain tangible results, to try the torpedoes and practice the men, I remained on the 18th, 19th, and 20th at Quinteros. In the afternoon of the day last named, I received through your Excellency" (the Balmacedist Admiral) "the news, despatched by his Excellency the President of the Republic, that the Revolutionary fleet, with a body of troops for landing, would be off Caldera on the morning of the 23rd. As soon as I learnt this, I communicated by telegraph to his Excellency a plan which I had formed in view of the sudden appearance of the Revolutionary fleet in the province of Atacáma. I explained that I should leave Quinteros on the morning of the 21st, so as to obtain news from Huasco on the afternoon of the 22nd; and that, having satisfied myself of the approach and whereabouts of the fleet, I should attempt an attack at daybreak on the 23rd.

"At eight o'clock on the morning of the 21st I left Quinteros and headed to the northward, having first given all the directions necessary for the successful carrying out of the plan of procedure. At two o'clock on the afternoon of the 22nd I reached Huasco, and received intelligence that at that time the ironclads Blanco Encalada and Almirante Cochrane, as well as the monitor Huascar, one of the corvettes, and three transports, were lying at anchor at Caldera. I therefore summoned the commander of the Lynch (Señor Fuentes) on board, and, after careful deliberation, a scheme of attack was agreed upon. I put to sea at five o'clock in the afternoon, and, soon afterwards, the Lynch, which had remained in the bay to try her torpedoes, signalled to me. When I had again put myself within speaking distance of her, she informed me that she had just heard from the shore that three columns of smoke were to be seen off Carrizal. This caused me to alter the plan which had been arranged; and we steamed away abreast of one another towards Caldera, the Lynch being to starboard of the Condell.

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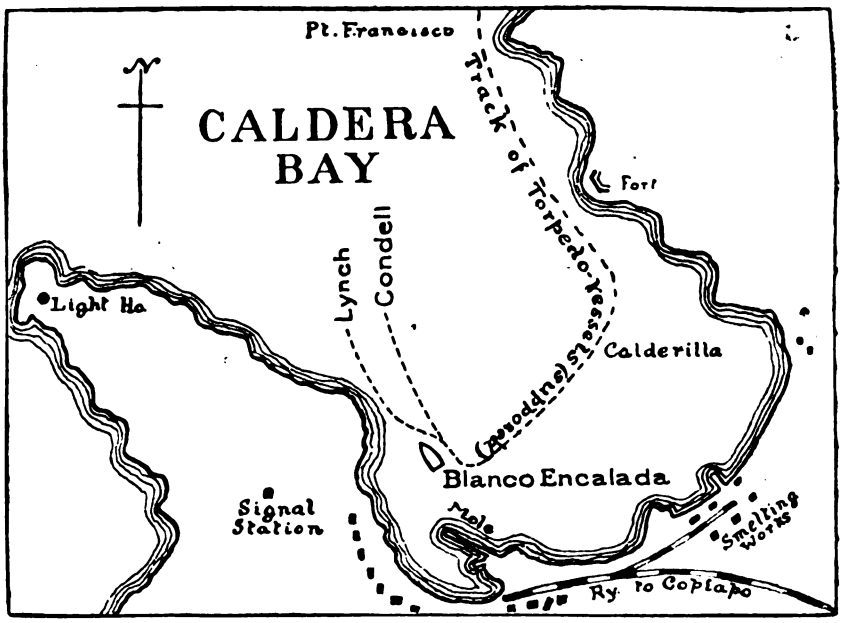
"According to the arrangement which was adopted, we were to arrive off Cabeza de Vaca at half-past three o'clock on the morning of the 23rd, so that, then skirting the coast northward of Caldera, we might first fire at the Revolutionary squadron with our bow torpedoes, and afterwards, turning to starboard, might utilise both the torpedoes on the port side. These operations were to be carried out in the first instance by the senior officer's ship, which was to open the attack.



Attack on Blanco Encalada.

"Shortly before four o'clock I led the way into Caldera Bay. As far as the moonlight would permit, I reconnoitred from the bridge the position of the Revolutionary vessels. In the meantime the Lynch followed in my wake at a distance of about eight or nine fathoms. When I had ascertained the situation of the ships, I headed at half speed straight for the Blanco or the Cochrane—for at the time I did not know which of the two vessels lay before me. Just astern of the ironclad I made out another craft, which, from her appearance, I took to be the Huascar. At a distance of about half a cable, I discharged my bow torpedo, which missed, and, almost grazing the stern of the ironclad, probably struck the vessel which lay close by. Immediately after this first shot I turned hard to starboard, and, at about ten fathoms, fired a port torpedo, which must have hit the bows of the ship I aimed at. Almost at the

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same instant I ordered Lieutenant Rivera to discharge the second torpedo from the same side. Between my second and third shots the ironclad opened fire on my ship with great quickness and steadiness, using machine, quick-firing and heavy guns. After my vessel had discharged her first torpedo, I put her at full speed. The fire of the ironclad remained concentrated upon us, and she did not apparently notice that the Lynch, which had followed the motions of the Condell, placed herself at very close range and discharged her bow torpedo, which, however, missed. Turning to starboard, the Lynch fired a second torpedo, which struck the Blanco nearly amidships. Two minutes later the Revolutionary vessel sank. Between the discharge of the Condell's first torpedo and of the Lynch's last, barely seven minutes elapsed."

Report of Captain Goñi.

The despatch of Captain Goñi, dated Caldera, 23rd of April, 1891, is much briefer. It begs the Governor of Chañaral to communicate the following to Señor Jorge Montt, at Iquique:—

"To my regret I have to inform your Excellency that the ship under my command was sunk this morning at half-past four o'clock by the combined attack of the torpedo-vessels Lynch and Condell. They succeeded in striking the Blanco with six out of seven torpedoes which they discharged. We have lost about one-half of our complement, including, among the officers, Paymaster Guzman, Lieutenant Pacheco, the aspirants Soto and Aguilar, and several engineers. I have also to lament the loss of Don Enrique Valdes Vergara. The torpedo-boat catchers received a heavy fire from the Blanco ere she went down, and afterwards from the Aconcagua, when, coming from Carrizal, she entered the harbour; but we are unable to ascertain what damage they have suffered. The ship is lying on her starboard side, with the tops of her bridges out of the water. I believe we shall be able to recover the guns on the upper deck, and later all the remainder. I have a diver here. I await here your Excellency's orders, and only add that I have sent the survivors on board the Aconcagua."

Account of *Patria*.

The disappointing brevity of Captain Goñi's despatch induces me, before I give the interesting information which has been most kindly furnished me by my friend Captain St. Clair, to extract a few details from the *Patria*, an Iquique newspaper which earned a good reputation for the general accuracy of its war correspondence, but which couched its news in such flowery language that I dare not attempt to translate any of it in full. According to this paper's correspondent at Caldera, the Huascar, Magellanes, and Cachapoal, which had accompanied the landing force,

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left Caldera again at ten in the morning of the 22nd for Carrizal, and were followed at two in the afternoon by the Aconcagua, the Blanco Encalada and Biobio only remaining. Of the Blanco's two steamboats, one was on deck under repair, and the other was in bad condition, and had been deprived of her armament. For this reason neither did guard-boat duty that night. This was exceptional. The Biobio was anchored on the port side of the ironclad, at a distance from her of half a cable. The officers of the watch in the Blanco were Commander Froilán Gonzalez and aspirant Luis Aguilar. Captain Goñi had turned in. When the enemy appeared the order was given "Clear ship for action," and fire was opened from the Nordenfelts and six-pounders; but the crew, apparently thinking that the ship was merely going to ordinary night quarters, were not very smart. The port engine was ordered to go ahead and the starboard to go astern, and the machinery, after a little delay, actually moved. The first torpedo missed; the second struck the Blanco on the starboard side in the neighbourhood of the dynamo-room and extinguished all the lights in the ship, causing the vessel also to heel to starboard, apparently before the water-tight doors had been closed. The first assailant then retired under a heavy fire. The second discharged a torpedo from ahead of the Blanco, which passed innocently along her side. Upon this, she also retired for a time, firing heavily, and a shell from her burst in the forward compartment of the ironclad, killing Lieutenant Pacheco. The second assailant finally took up the position which the first had previously occupied, and discharged a torpedo, which struck the Blanco on the starboard side between guns No. 1 and No. 3. Thereupon the vessel began to sink rapidly. Captain Goñi only ordered her to be abandoned when the battery deck on the starboard side was on a level with the water. She went down five or six minutes after having received the first torpedo; and while her people were struggling in the water, the enemy fired on them. The Biobio, which had narrowly escaped a torpedo that passed under her bows, and which had not suffered at all, lowered three boats, and two more pushed off from the shore, while one small boat belonging to the Blanco floated. This last picked up Captain Goñi. The others also picked up many, and some swam ashore; but all the people who were below must have been drowned. Out of a total of 26 officers and 258 men, 11 officers and 171 men were lost.

Discrepancies in accounts.

That there are mistakes both in the *Patria's* account and in the despatches of Señores Moraga and Goñi will, I think, appear from a perusal of the details with which Captain St. Clair favours me. He

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was on the spot very soon afterwards; his officers had plenty of opportunity of hearing many stories from both sides; and his Gunnery Lieutenant, Mr. R. B. Colmore, examined the sunken ship by the aid of divers, and made an official report concerning it only two days after the action. That the participants in so short and sharp a piece of work should not agree about all particulars is only to be expected. The British officers, on the other hand, were able to hear, weigh, and collate evidence. Captain St. Clair writes:—

Captain St. Clair's observations.

"The Almirante Condell and Almirante Lynch were commanded by Captains Moraga and Fuentes, both of whom had received torpedo training at the Torpedo School in Valparaiso under Captain Santa Cruz; and they had the services of an experienced French torpedo-artificer, who had recently arrived from Europe to repair and adjust torpedoes for the Chilian Government. The armament of each ship consisted of three 14-pr. 3-in. Q.F. Hotchkiss guns, two being on the forecastle *en échelon* and one on the poop; four 3-pr. 1·85-in. Q.F. Hotchkiss guns, two being on the poop and one, on a sponson, on each beam; and five torpedo-tubes, one ahead and two on each beam. The guns were arranged so that two of the 14-prs. could be trained in any direction except right astern, where only one 14-pr. would bear; but both ahead and astern all four of the 3-prs. could be brought to bear.

"According to accounts given by the surviving officers of the Blanco, the morning was dull and cloudy, the moon at intervals being completely obscured. At about 4 A.M. the torpedo-vessels were sighted by the look-out men at a distance of some 2000 yards. The alarm was at once given, but, owing to the bugler mistaking the orders and sounding the ordinary reveillé instead of the call for action, some delay took place in getting the crew to their quarters. By this time the torpedo-vessels had approached within 500 yards on the starboard bow, and fire, which was at once returned, was opened on them from quick-firing and machine-guns. The Condell at the same time discharged her bow torpedo, which passed ahead of the ironclad, and, running on shore, exploded there. The vessels then appeared to stop their engines, and orders were given on board the ironclad to slip the cable and go ahead with the port engine and astern with the starboard; but these orders do not appear to have been carried out. The Lynch at the same time went at full speed ahead, passing along the Blanco's starboard beam, and discharging both tubes at a distance of about 100 yards. One of the torpedoes struck the Blanco and exploded, and the vessel slowly heeled over and sank in less than five minutes, after firing one of

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her heavy guns, the shell from which passed over the Lynch without damaging her. The Lynch meanwhile went under the ironclad's stern and discharged her bow torpedo at the transport Biobio, but without effect. The torpedo is said to have passed underneath her. The torpedo-vessels then steamed out of the bay, apparently uninjured."

Examination of wreck.

The examination of the wreck was most carefully made under the direction of Lieutenant Colmore, R.N., and it disclosed some interesting facts.

"The Blanco," continues Captain St. Clair, "was found to be lying on her starboard side in about 60 feet of water at low water-mark, and rested on the ground from the bilge-keel upwards. A large hole, blown through the bottom of the ship, extended about 15 feet in a fore and aft direction, and was about 7 feet broad, its extremity being about 2 feet before and 5 feet above the main inlet valve. All round the hole the iron skin was separated by some distance from the wood sheathing; and the external zinc (the protection is zinc instead of copper) was much displaced in the vicinity. The thickness of the plate driven in was $\frac{5}{8}$ in., and the sheathing consisted of from 4 to 6 in. of wood behind the zinc. The port side of the ship remained intact. The starboard side, from the bilge-keel upwards, could not, owing to its position, be examined. The scuttles were all open on the port side, and the officers' ports were the only ones closed. Although the order to close watertight doors was given, it is improbable that it was carried out. The electric light was not used. Captain Goñi appears to be quite certain that only one torpedo exploded under the vessel. Some officers who were on the main deck on the port side describe the shock as having been severely felt there. They say that one of the 8-in. guns on the starboard side was thrown off its trunnions, and that men were killed on that side. On the upper deck and after-bridge the shock was felt only slightly. The total loss of life was said to be 150 officers and men, of whom 40 are estimated to have been killed by the fire from the quick-firing guns. Of 11 officers who were missing, 6 were engineers. The only engineer who was saved was washed up one of the ventilators. He said that the others were killed by the pieces of machinery which flew about.

"The torpedo fired at the Biobio was subsequently picked up, and proved to be a Mark IV. Fiume. It had been set for a distance of 600 metres, a depth of 6 metres (19·6 ft.), and to sink. The pistol had evidently been taken to pieces and altered after it had left Fiume, and the alteration had been performed by an unskilful workman. The detonator had not been struck."

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Further reports show that the Blanco Encalada hit the Lynch four times. One shot cut the electric wires of a torpedo-tube just after the torpedo had been discharged, and a few men were wounded by flying splinters.

VI. The Aconcagua and the Gun-vessels.

After they had sunk the Blanco Encalada, the Almirante Condell and Almirante Lynch withdrew. At six o'clock they returned to satisfy themselves as to the damage which had been done; but an Armstrong gun in the North Fort was fired at them, and they again departed at full speed. Presently they sighted the Aconcagua, which was coming back from the expedition to Carrizal. Here is the report of Captain Vincente Merino Jarpa, of the transport, concerning what occurred:—

Report of Captain of Aconcagua.

"At seven o'clock on the morning of the 23rd of April it was reported to me from the forecastle that the Condell and Lynch had been sighted off Morro Copiapo at a distance of about 7000 metres (7655 yards). I at once ordered the ship to be headed in that direction, caused 'Clear for action' to be sounded, and increased my speed. When I was about 4000 metres (4374 yards) from them I opened fire with my quick-firing guns. This was immediately returned by both vessels with great rapidity and promptness. So incessant was the discharge that it resembled that of small-arms rather than that of guns. At first the vessels separated, as if to place us between two fires, but they soon altered their intention, possibly because they realised that the manœuvre would have enabled me to use the guns on both broadsides. Both put themselves on our port beam. One of them was soon struck by a shell, and emitted such quantities of smoke and steam that for a period of two minutes she was completely invisible to us. Her speed from that moment sensibly diminished, and she fell away on the Aconcagua's port quarter, while the other craft kept parallel with us at a distance of from 1500 (1640) to 2000 metres (2187 yards).

"As this position did not permit me to use all my guns, I turned and headed the Aconcagua for the leading ship, and so was enabled to bring two of my 13-cm. (5·1-in.) guns into action. Upon this, the torpedo-vessel increased her speed, and withdrew, keeping away to seaward. I continued firing until she was out of range. I then made for the harbour, where, to my sorrow, I received the sad news of the sinking of the Blanco by the treacherous audacity of the very craft which I had just been engaged with. The action began at seven, and ended at twenty past eight in the morning. During that

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time we fired, without ceasing, 197 rounds, including seven from the 13-cm. guns. The rest were from the quick-firing guns, with a few from our Hotchkiss mitrailleuse. The Aconcagua's speed throughout the action was 11 knots. Out of more than 400 projectiles which the enemy fired from his quick-firing guns, eight only struck the ship, and these hit the woodwork above the water-line, and did but little damage to the vessel and her company. We had four slightly wounded—the boatswain, one seaman, and two soldiers of the Esmeralda Battalion, who were in charge of the equipment of their corps. This action confirms the opinion that torpedo-vessels are useful only for surprise attacks. The view that they are worth nothing as fighting craft will perhaps be shared by the naval officers of the Dictator, when they reflect that, during a hot conflict of nearly an hour and a half they gained absolutely no advantage over a simple merchant-steamer, whose classification as a man-of-war arises from the fact that she is temporarily armed with a few guns of small calibre. From this it results that torpedo-vessels are lost from the moment when they encounter one of our regular warships, if only she can bring them to action."

Report of Captain Moraga.

Captain Moraga, of the Almirante Condell, in officially reporting the action, said :—" As we drew off from Caldera we fell in with the transport Aconcagua, which came from the southward as if to enter the bay. As soon as she recognised us, she endeavoured to get away, turning to seaward, and at the same time opening fire on us. When the Revolutionary transport perceived that, on account of our superior speed, retreat was hopeless, she again headed for Caldera, possibly in expectation of there sighting her consorts and being assisted by them. She was at once engaged by the two torpedo-vessels in an action which lasted an hour and a half. During this period the fire of the Lynch and Condell silenced that of the Aconcagua, and forced that ship to stop her engines. She did not strike, for she fought without her flag. At the critical moment of the action there appeared on the horizon smoke which I took to be that of the Esmeralda, and, in addition, several tubes in one of the port boilers burst, and obliged the engineers for a few moments to leave their employment in that compartment. In consequence of these occurrences I headed to the southward, and ordered the Lynch to permit the prey to depart. Soon afterwards I discovered that the vessel which had been sighted was the ironclad Warspite of the British Navy. She was making for the harbour. The Aconcagua took advantage of the situation to steam with all speed for Caldera, and to place herself under the protection of the forts."

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The correspondent of the *Patria*, who saw the action, adds, as additional details, that the two soldiers were wounded by a shell which struck the funnel casing and burst on the upper deck; that the greater part of the engagement took place off Caderilla; that the distance decreased at times to about 600 yards; and that one of the Hotchkiss revolving-cannons became useless during the fight, after having discharged only about twenty shots. It does not seem to have been struck. At this period the Aconcagua had only two of these weapons on board. Captain St. Clair, R.N., doubts whether the Condell was hit, but learnt that the Lynch returned to Valparaiso with her after compartment full of water and her steam-pipe damaged. Whether the injuries were inflicted by the Blanco or by the Aconcagua is not known.

Additional details from *Patria*.

During the rest of the war the Almirante Condell, Almirante Lynch, and Imperial were constantly moving hither and thither, but they did no further damage to the Congressionalist navy. Though once or twice chased by the Esmeralda, they always succeeded in escaping, and never suffered any injury.

In June the Condell and Imperial made a raid on the coast of Tarapaca, and fired into some of the undefended towns there; but they did little harm, and the only result of the expedition was the extortion from a company at Tocopilla of a cheque for 47,500 dollars as "nitrate dues," under a threat of burning all the nitrate in the place. Their action was vigorously protested against by the foreign ministers at Santiago, and the end of the matter was that the cheque was never presented for payment.

VII. The Final Operations.

In the third week of August began the final scenes of the campaign. Nearly the whole of the Congressionalist fleet went south, carrying with it the greater part of the Congressionalist army. The Huascar, left in charge at Iquique, was the only important vessel that did not take part in this movement.

Congressionalist fleet and army proceed south.

A rendezvous had been arranged about 100 miles to the westward of Valparaiso, and there the fleet assembled. It consisted of three divisions, composed as follows:—

First Division.	Second Division.	Third Division.
Biobio.	Almirante Cochrane.	Copiapo.
Condor.	Esmeralda.	Cachapoal.
Huemul.	Aconcagua.	Maipo.
Abtao.	Amazonas.	Carlos Roberto.
	Magellanes.	O'Higgins.
	Bismarck.	

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During the night of August the 19th the fleet proceeded slowly and in excellent order for Quinteros Bay, and at four o'clock on the morning of the 20th the light craft approached at full speed in order to discover whether or not it was true, as had been reported, that the Balmacedists had placed two rows of mines across the mouth of that haven. Upon the Biobio signalling that all was clear, the rest of the ships entered and took up their appointed anchorages.

It should here be mentioned, that on the 19th the Esmeralda was temporarily detached, and, appearing off Valparaiso, engaged Forts Valdivia and Verbas Buenas; and that on the morning of the 20th, it being somewhat foggy, the Sargente Aldea and Guale ventured out of Valparaiso, apparently to observe from seaward what was going on off Quinteros, but were driven back by the Esmeralda, Magellanes, and Biobio.

Landing in Quinteros Bay.

The apparatus for disembarkation in Quinteros Bay consisted of sixteen specially built, flat-bottomed punts or prahms with square overhanging bows and sterns, suitable for being run up on a beach. Each accommodated 110 men. They were brought from the north fastened bottom outwards against the outsides of some of the ships. Horses and mules were put into the water and allowed to swim ashore; and, as the landing-place was most suitable—a shelving sand—and the weather fair and calm, there were no mishaps.

The force landed, according to a Congressionalist officer whose account afterwards appeared in the *Times*, was made up of 8200 infantry, three batteries of field artillery, one naval battery, and 600 cavalry—in all nearly 10,000 men. The landing began at 9 A.M., and occupied a little more than 12 hours, its procedure, owing to there being a full moon, and to the absence of interference from the enemy, not suffering the slightest interruption at nightfall. Troops of all arms had begun to move away from the beach by 4.30 P.M.

Battle of Colmo.

On the 21st was fought the Battle of Concon, or Colmo. The object of the Balmacedists was to prevent the invaders from crossing the river Aconcagua. The Esmeralda and Magellanes co-operated on the right wing of the attack, and the shells from the former, very effective up to 10,000 yards, made great havoc with the Balmacedist left wing, which rested on the shore. The moral effect of the fire was even more useful than the material. The Congressionalist success at Concon laid open the way for the advance to Vina del Mar, a watering-place five miles from Valparaiso. There was some firing on the evening of the 22nd, but the position was strong, its left flank being protected by Fort Callao. On the 23rd the land forces pushed inland to the left towards Quilpué, while the Almirante

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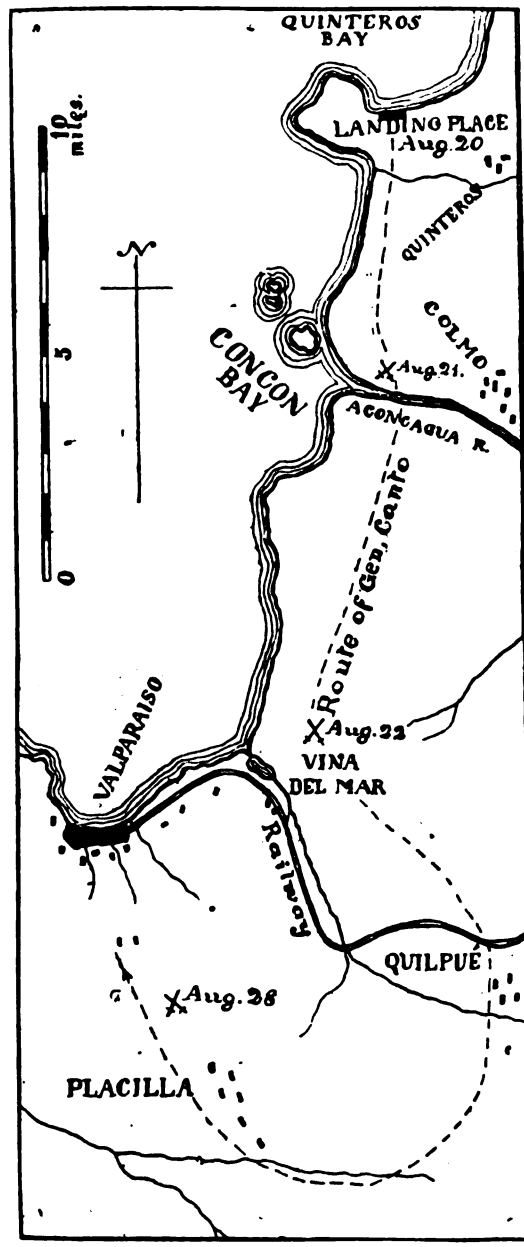
Cochrane and Esmeralda diverted attention by engaging the fort. The results were, however, very slight. The ships were not hit at all, and those shells that reached the shore from the ships did not burst. After some time the vessels drew off to Quinteros Bay.



The troops rested at Quilpué, and by the 27th reached Placilla, only three or four miles from Valparaiso. The issue of the bloody action which was fought there early in the morning of the 28th decided the war, and placed Valparaiso at the mercy of the Congressionalists. The place was completely occupied by five in the afternoon, and, half an hour later, the Almirante Cochrane anchored in the harbour. The foreign warships present were: British, Champion and Daphne; German, Leipzig (Rear-Admiral), Alexandrine, and Sophie; French, Champlain (Rear-Admiral) and Volta; and American, San Francisco (Rear-Admiral) and Baltimore. Strong landing parties were sent ashore by the British, German, and American vessels, and the foreign

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quarters were guarded by them for two days, until the Provisional Government was able to give satisfactory assurances of its power to keep order. Thus, no harm was done to foreigners. The American and French Admirals and Captain St. Clair were happily able, though at the imminent risk of their lives, to prevent Señor Claudio Vicuña, the Balmacedist president-elect, from massacring, by fire from two machine-guns, a considerable crowd which had assembled, immediately after the surrender of the town, outside the Intendencia. Elsewhere they could not interfere with equal effect.

Almirante Lynch. When the Congressionalist fleet first appeared at Quinteros, the Almirante Lynch was lying in Valparaiso Harbour. On August the 22nd she weighed, steamed across to the eastern side of the bay, and tried the range of her quick-firing guns upon the hills inland. While she was thus engaged, the breech of one of her 14-pr. 3-in. Q.F. Hotchkiss guns blew off, killing an officer and injuring several of the crew; whereupon she returned to her moorings, and there remained until the city fell, when her captain deserted her and took refuge on board the Leipzig, flagship of Admiral Valois. It is believed that the accident to the gun arose from the employment of improper powder. The mob remembered against the Lynch her sinking of the Blanco Encalada, and when the defence of Valparaiso ended, a number of low ruffians opened small-arm fire upon the gun-vessel from the wharf. Her men replied with the quick-firing and machine-guns, but the desperadoes finally made their way on board and shot down three of the crew. Nor was this the only excess. The same mob tried to take possession of the lower parts of the city, and on the night of the 28th, fire and riot reigned there, and two or three hundred—all of the most scoundrelly type—were killed in the streets.

At the time of the surrender the Almirante Condell and Imperial were not at Valparaiso. They had sailed on August the 22nd, with the object of transporting troops from Coquimbo to Talcahuano; but suspecting that the Balmacedist cause had collapsed, they proceeded to Callao, and there, on September the 3rd, gave themselves up to the representatives of the Provisional Government of Chili.

Conclusions.

The naval portion of the Chilian Civil War appears chiefly to enforce the following lessons:—

a. The value of speed, and consequent mobility, in warships of a certain class in certain circumstances.

b. The importance of sea-power.

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c. The difficulty of effectively using the Whitehead torpedo, save when it is in the hands of people thoroughly familiar with it; and the untrustworthiness of the human element in torpedo-warfare.

d. The usefulness of the Whitehead, when properly employed.

e. The enormous waste of projectiles that may be expected in modern warfare.

f. The destructiveness of good heavy shell-fire.

g. The unsuitableness of torpedo gun-vessels for artillery action with other ships.

Importance of speed.

It must be conceded that those of the above lessons which are the most striking are not the most novel, and that those which are the most novel are not the most important. The importance of speed is everywhere recognised. In Chili, her speed alone rendered the Imperial a useful craft to the Balmacedists; and their speed alone enabled the gun-vessels to sink the Blanco Encalada. I cannot take into serious consideration the assertion that Captain Goñi believed that no Chilian would try to sink his ship. Had he fully realised that he was within the sphere of action of the Condell and Lynch, he would scarcely have lain in Caldera Bay without taking defensive precautions. Believing them to be three or four hundred miles away, he seems to have thought of them as of 10-knot vessels, and to have altogether forgotten that they could put 150 knots behind them in about eight hours.

Sea-power.

The importance of sea-power, also, is everywhere recognised—thanks, largely, to Captain Mahan's admirable demonstration. The successful operations that began with the landing in Quinteros Bay teach us, therefore, nothing that is new about sea-power.

Human element in torpedo-warfare.

Nor is the untrustworthiness of the human element in torpedo-warfare, as exampled in the Blanco and Imperial affairs, a revelation to any who have seen much of torpedo-boat work at manœuvres and on similar occasions. To use any torpedo effectively, even in peace time, requires not only coolness and self-command, but also great carefulness, and, above all, long training. The illustration given by the destruction of the Blanco of what a Whitehead will do when properly employed is almost a revelation, especially if, as would seem to be the case, only one torpedo hit the ship. It is not surprising that the Blanco was sunk; but it is, I think, surprising that so extensive a wound was inflicted upon her—a wound which, even had all her water-tight doors been closed, might easily have been fatal to her.

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Waste of ammunition.

The waste of projectiles was conspicuous in the engagements between the Blanco and torpedo gunboats, the Aconcagua and torpedo gunboats, and between the Esmeralda and Fort Callao. Much of it was, no doubt, due to the men's lack of training: more, perhaps, to the fatal facility with which modern weapons can be loaded, fired, and reloaded. All these episodes point to the supreme value of fire-discipline.

Destructiveness of shell-fire.

The destructiveness of well-aimed heavy gun-fire was illustrated by the result of the single round fired by Fort Valdivia at the Blanco Encalada. In this case a sand-weighted shell of only 250 lbs. weight killed and wounded twelve people. Had it been filled with one of the modern high-explosives, and had it burst where it actually broke up, it would, it is believed, have mangled or suffocated every one of the forty men in the compartment. The 130 lbs. shell, fired at the same time from the other fort, was caused by the battery armour to burst outside the ship. Though bursting there, it might easily have killed or wounded several men, owing to its action upon the bolt which it drove in. At the same time, bursting outside, the gases of its explosion were innocuous; and I venture to think that in modern ships it is almost as important to keep out gases as to keep out fragments of shell. Such, at least, were, I have been informed, the general teachings of the Resistance experiments in which high-explosives were employed.

Sphere of torpedo gun-vessels.

As for the conclusions concerning the unsuitableness of torpedo gun-vessels to artillery action with other ships, nothing seems to have occurred to contradict the views expressed on the subject by Captain Merino Jarpa, of the Aconcagua. All the lessons of the campaign appear to tell in favour of the limitation, so far as may be possible, of the functions of torpedo-vessels to the making of sudden and unexpected raids, similar to the one which was made, during the British manœuvres of 1890, from the Channel Islands upon Sir George Tryon's fleet at Plymouth. Their guns should be primarily regarded as defensive, and their torpedoes as their true offensive weapons.

W. Laird Clowes.

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PART II.

BRITISH AND FOREIGN

ARMOURED AND UNARMOURED SHIPS.

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PART II.

I.

BRITISH ARMOURED AND UNARMOURED SHIPS.

THE list of ships of the British Navy has been compiled from various sources. The official *Navy List* has been the principal guide, and the list is also in accordance with the Navy Estimates for 1892–93. The displacement and indicated horse-power have been given as stated in the *Navy List*. With respect to the gun and torpedo armament, it is to be noted that, owing to the gradual substitution of breech-loaders for muzzle-loaders at present in progress, to the advance in the power of quick-firing guns, &c., changes are being continuously made. Under the head of coal endurance, the mileage traversible at the speed mentioned has been computed from the quantity of fuel that can be carried in the bunkers. The computations have, moreover, been based upon performances, or estimates of performances, under the most favourable conditions of wind and sea, and in every other respect, both as to hull and machinery, the bottom being quite clean, and without making any allowance for the consumption of fuel by the numerous auxiliary engines now on board all modern warships.

To prevent confusion, the vessels popularly known as torpedo catchers are in these lists called 1st class or torpedo gunboats. In the official *Navy List* they are called first-class gunboats.

The sketches of the ships are all drawn on the same scale (except in a few cases specially indicated), so that their relative sizes are apparent by inspection.

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GREAT BRITAIN.—Armoured Ships.

a.c., armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t.*, turret-ship; 2 *s.*, two screws.

M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; l., light guns under 15 cwt., including boats' guns; Q.F., quick-firing gun; M., machine gun; *comp.*, compound or steel-faced armour; f. tu., l. car., fixed tube or launching carriage for Whitehead torpedo discharge.

Class	NAME.	Displacement.	Indicated Horse-Power.	Draught of Water. Extreme.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Completion.	Cost.		Armour.			Backing.	Armament.		Speed.	Coal Endurance.	
										Hull.	Machinery.	Side.	Bulkhead.	Turret.	Deck Plating.	Guns.	Fish Torpedo Dischargers.		Coals that can be carried in Bunkers.	Distance that can be steamed at 10 knots speed.
		tons.		ft. in.	ft. in.	ft. in.				£	£	in.	in.	in.	in.			knots.	tons.	knots.
br.	**Achilles** (iron)	9820	5000	27 3	380 0	58 3½	Chatham	Penn	1864	375,429	69,117	4½	4½	..	18 to 10	14 9-in. 12-ton M.L.R., 2 6-in. 5-ton B.L.R., 8 3-pdr. Q.F., 16 M., 2 l.	..	14·32	750	2500
t.	**Agamemnon** 2 *s.* (iron)	8660	6360	24 0	280 0	66 0	Chatham	Penn	1883	402,295	101,770	18 & 15	16½ & 13½	16 & 14	18 to 9 3″	4 12½-in. 38-ton M.L.R., 2 6-in. 81-cwt. B.L.R., 6 6-pdr. Q.F., 1 3-pdr. do., 12 M., 2 l.	2 l. car.	13·25	960	4100
br.	**Agincourt** (iron)	10,690	5000	27 9	400 0	59 5	Birkenh'd	Maudslay	1868	381,700	83,777	5½	4½	..	10	17 9-in. 12-ton M.L.R., 16 M., 14 l.	2 l. car.	14·8	750	1300
t.	**Ajax** (iron) 2 *s.*	8660	6440	24 0	280 0	66 0	Pembroke	Penn	1883	411,622	106,735	18 & 15	16	16	18 to 9 2″	4 12½-in. 38-ton M.L.R., 2 6-in. 81-cwt. B.L.R., 6 6-pdr. Q.F., 13 M., 2 l.	2 l. car.	13·25	960	4100
c.b.	**Alexandra** . 2 *s.* (iron)	9490	8610	26 6	325 0	63 8	Chatham	Humphrys	1877	394,263	120,061	12 to 6	8 to 5	..	12 & 10 1½″–1″	8 18-ton M.L.R., 4 9·2-in. 22 ton. B.L.R., 6 4-in. 22-cwt. do., 4 6-pdr. Q.F., 6 3-pdr. do., 13 M., 3 l.	4 l. car.	15·00	680	2700

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b.	**Anson** (steel) 2 s.	10,600	11,500	27	3	330	0	68	6	Pembroke	Humphrys	1889	x and y 724,765		18 comp.	16 comp.	barbette 14 & 12 comp.	12 to 15 3″–2½″	4	13½-in. 67-ton B.L.R., 6 6-in. 89-cwt. do., 12 6 pdr. Q.F., 7 3-pdr. do., 7 M., 2 l.	1 f. tu., 4 l. car.	16·75	1200	7100
c.b.	**Audacious** . 2 s. (iron and zinc sheathed)	6010	4830	23	8	280	0	54	0	Glasgow	Ravenhill .	1869	193,863	52,619	8 to 6	5	..	10	10	9-in. 12-ton M.L.R., 8 4-in. 22-cwt. B.L.R., 4 6-pdr. Q.F., 6 3-pr. do., 6 M., 3 l.	4 l. car.	13·2	500	1260
a.c.	**Aurora** (steel) 2 s.	5600	8500	22	6	300	0	56	0	Pembroke	J. & G. Thomson	1889	x 220,550	y 64,000	10 comp.	16 comp.	12 conning tower.	6 3″–2″	2	9·2-in. 22-ton B.L.R., 10 6-in. 89-cwt. B.L.R., 6 6-pdr. Q.F., 10 3-pr. do., 6 M., 3 l.	2 l. car.	18·5	900	8000
a.c.	**Australia** . 2 s. (steel)	5600	8500	22	6	300	0	56	0	Glasgow	Napier .	1888	195,390	63,000	10 comp.	16 comp.	12 conning tower.	6 3″–2″	2	9·2-in. 22-ton B.L.R., 10 6-in. 5-ton B.L.R., 6 6-pdr. Q.F., 10 3-pr. do., 6 M., 3 l.	4 l. car.	18·5	900	8000
b.	**Barfleur** (steel) 2 s. (Copper sheathed.)	10,500	13,000	25	6	360	0	70	0	Chatham	Greenock Foundry	Bldg.	Total. 599,089		12 comp. 4 above	12 comp.	9 barbette	.. 2½″–2″	4	10-in. 29-ton B.L.R., 10 4·7-in. Q.F., 8 6-pdr. and 9 3-pr. do., 7 M., 2 l.	7 f. tu. 2 being submerged.	18·0	750	..
c.b.	**Belleisle** (iron) 2 s. (was "Payki-Sherreef").	4870	3200	21	0	245	0	52	0	Poplar .	Maudslay .	1878	240,000 (purchased)		12, 10, 8, 6	9, 6, 5	9 conning tower.	16 & 9 3″–1″	4	12-in. 25-ton M.L.R., 6 6-pdr. Q.F., 9 M., 2 l.	2 l. car.	12·20	510	1824
c.b.	**Bellerophon** (iron)	7550	6520	26	7	300	0	56	1	Chatham	Penn .	1866	235,738	86,963	6	5 8 pilot tower.	..	10	10	8-in. 14-ton B.L.R., 4 6-in. 89-cwt. do., 6 4-in. 22-cwt. do., 4 6-pdr. Q.F., 12 M., 3 l.	2 l. car.	14·17	650	1610
b.	**Benbow** (steel) 2 s.	10,600	11,500	28	4	330	0	68	6	Blackwall	Maudslay .	1888	x 650,820	y 110,000	18 comp.	16 comp.	14 & 12 on barbette comp.	12 to 15 3″–2½″	2	16¼-in. 111-ton B.L.R., 10 6-in. 5-ton do., 8 6-pdr. Q.F., 7 3-pr. do., 7 M., 2 l.	1 f. tu. 4 l. car.	16·75	1200	7100

x Includes Hydraulic Machinery, Gun Mountings, &c. y Propelling Machinery.

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GREAT BRITAIN.—Armoured Ships—*continued.*

a.c., armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t*, turret-ship; 2 *s.*, two screws.

M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; l., light guns under 15 cwt., including boats' guns; Q.F., quick-firing gun; M., machine guns; *comp.*, compound or steel-faced armour; f. tu., l. car., fixed tube or launching carriage for Whitehead torpedo discharge.

Class.	NAME.	Displacement.	Indicated Horse-Power.	Draught of Water. Extreme.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Completion.	Cost. Hull.	Cost. Machinery.	Armour. Side.	Armour. Bulkhead.	Armour. Turret.	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dischargers.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
		tons.		ft. in.	ft. in.	ft. in.				£	£	in.	in.	in.	in.			knots.	tons.	knots.
br.	**Black Prince** (iron)	9210	5770	26 10	380 2	58 4	Glasgow	Penn	1862	283,154	74,482	4½	4½	..	18 to 10	4 8-in. 9-ton M.L.R., 22 7-in. 6½-ton do., 2 6-in. 89-cwt. B.L.R., 4 3-pdr. Q.F., 7 M., 8 l.	2 l. car.	13·60	750	1080
b.	**Camperdown** 2 *s.* (steel)	10,600	11,500	27 3	330 0	68 6	Portsm'th	Maudslay	1889	*x* and *y* 769,456		18 *comp.*	16 *comp.*	12 to 14 on barbette *comp.*	10 to 15 3"–2½"	4 13½-in. 67-ton B.L.R., 6 6-in. 5-ton do., 12 6-pdr. Q.F., 7 3-pr. do., 7 M., 2 l.	1 f. tu. 4 l. car.	16·75	1200	7100
b.	**Centurion** 2 *s.* (steel, copper sheathed)	10,500	13,000	25 6	360 0	70 0	Portsm'th	Greenock Foundry	Bldg.	Total. 608,098		12 *comp.* 4 above	12 *comp.*	9 barbette *comp.*	.. 2½"–2"	4 10-in. 29-ton B.L.R., 10 4·7-in. Q.F., 8 6-pdr. and 9 3-pr. do., 7 M., 2 l.	7 f. tu. 2 being submerged.	18.0	750	..
b.	**Collingwood** 2 *s.* (steel)	9500	9570	26 10	325 0	68 0	Pembroke	Humphrys	1886	*x* 520,000	*y* 104,000	18 *comp.*	16 *comp.*	12 to 14 on barbette *comp.*	17 to 10 2½"	4 12-in. 45-ton B.L.R., 6 6-in. 89-cwt. do., 12 6-pdr. Q.F., 3 3-pr. do., 11 M., 2 l.	4 l. car.	16·50	1200	8500
t.	**Colossus** (steel) 2 *s.*	9420	7500	26 3	325 0	68 0	Portsm'th	Maudslay	1886	533,000	113,786	18 & 14 *comp.*	16 & 13 *comp.*	16 & 14 *comp.*	22 to 10 3"–2½"	4 12-in. 45-ton B.L.R., 5 6-in. 5-ton do., 4 6-pdr. Q.F., 10 3-pdr. do., 6 M., 4 l.	2 l. car.	15·50	970	6200

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t.	**Conqueror.** (steel)	2 *s.*	6200	6000	24	0	270	0	58	0	Chatham	Humphrys	1882	325,000	93,433	12 to 8½	11½ to 10½	12 turret & conning tower.	13½ to 9 2½–1¾"	2	12-in. 45-ton B.L.R., 4 6-in. 89-cwt. do., 6 6-pdr. Q.F., 12 M., 2 l.	6 l. car.	15·50	650	5200
c.s., t.	**Cyclops** (iron)	2 *s.*	3560	1660	16	4	225	0	45	0	Blackwall	Elder .	1871	136,426	17,600	8 & 6	9 & 8 on breastwork.	9 & 10	9 & 11 1½"	4	10-in. 18-ton M.L.R., 4 3-pdr. Q.F., 5 M., 1 l.	..	11·0	250	1920
br.	**Defence** (iron) (Floating Factory)		6270	2540	26	7	280	0	54	2	Jarrow .	Penn .	1862	197,879	34,357	4½	4½	..	18	2	9-ton M.L.R., 14 6½-ton do., 6 M., 4 l.	..	11·62	450	1100
t.	**Devastation** (iron)	2 *s.*	9330	7000	27	6	285	0	62	3	Portsm'th	Penn .	1873	290,660	63,188	12 & 10	12 & 10 breastwork.	14 & 12	18 to 16 3"–2"	4	10-in. 29-ton B.L.R., 6 6-pdr. Q.F., 8 3-pdr. do., 5 M., 2 l.	2 l. car.	13·84	1800	5980
t.	**Dreadnought** (iron)	2 *s.*	10,820	8210	26	9	320	0	63	10	Pembroke	Humphrys	1875	485,573	107,000	14, 12, 11	13	14	18 to 15 3"–2"	4	12½-in. 38-ton M.L.R., 6 6-pdr. Q.F., 2 3-pr. do., 7 M., 2 l.	2 f. tu.	14·20	1330	5720
t.	**Edinburgh** . (steel)	2 *s.*	9420	7500	26	3	325	0	68	0	Pembroke	Humphrys	1886	*x* 555,333	*y* 87,000	18 & 14 *comp.*	16 & 13 *comp.*	16 & 14 *comp.*	22 to 10 3"–2½"	4	45-ton 12-in. B.L.R., 5 6-in. 5-ton do., 4 6-pdr. Q.F., 3 3-pr. do., 13 M., 2 l.	2 l. car.	15·50	970	6200
b.	**Empress of India** (steel)	2 *s.*	14,150	13,000	27	6	380	0	75	0	Pembroke	Humphrys	Bldg. Ld. 1891	Total. 842,512		18 *comp.* 4 above the belt.	16 *comp.*	17 barbette. *comp.*	.. 3".	4	67-ton B.L.R., 10 6-in. Q.F. and 25 other Q.F., 8 M., 2 l.	7 f. tu. or l. car.	17·5	900	5000
a.c.	**Galatea** (steel)	2 *s.*	5600	8500	22	6	300	0	56	0	Glasgow .	Napier	1889	*x* 195,390	*y* 63,000	10 *comp.*	16 *comp.*	12 *comp.* conning tower.	6 3"–2"	2	9·2-in. 22-ton B.L.R., 10 6-in. 5-ton do., 6 6-pdr. Q.F., 10 3-pr. do., 6 M., 3 l.	4 l. car.	18·5	900	8000
c.s., t.	**Glatton** (iron)	2 *s.*	4910	2870	19	5	245	0	54	0	Chatham	Laird .	1872	189,133	30,396	12 to 10	12 breastwork.	14 & 12	20 to 15 3"–1½"	2	12-in. 25-ton M.L.R., 3 6-pdr. Q.F., 4 M., 1 l.	2 sub. f. tu.	12·11	540	2000

x Includes Hydraulic Machinery, Gun Mountings, &c.

y Propelling Machinery.

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GREAT BRITAIN.—Armoured Ships—*continued.*

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M.L.R., muzzle-loading rifled gun; B.L.R. breech-loading rifled gun; l., light guns under 15 cwt., including boats' guns; Q.F., quick-firing gun; M., machine guns; *comp.*, compound or steel-faced armour; f. tu., l. car., fixed tube or launching carriage for Whitehead torpedo discharge.

Class.	NAME.	Displacement.	Indicated Horse-Power.	Draught of Water. Extreme.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Completion.	Cost. Hull.	Cost. Machinery.	Armour. Side.	Armour. Bulk-head.	Armour. Turret.	Back-ing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dischargers.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
		tons.		ft. in.	ft. in.	ft. in.				£	£	in.	in.	in.	in.			knots.	tons.	knots.
c.s., t.	Gorgon (iron) 2 s.	3560	1670	16 4	225 0	45 0	Jarrow	Ravenhill	1872	122,904	15,663	8 & 6	9 & 8 breast-work.	9 & 10	11 to 9 1½″	4 10-in. 18-ton M.L.R., 4 3-pdr. Q.F., 5 M., 2 l.	..	11·14	270	1230
c.s., t.	Hecate (iron) 2 s.	3560	1750	16 4	225 0	45 0	Poplar	Ravenhill	1872	124,906	15,687	8 & 6	9 & 8 breast-work.	9 & 10	11 to 9 1½″	4 10-in. 18-ton M.L.R., 4 3-pdr. Q.F., 4 M., 1 l.	..	10·90	270	1230
br.	Hector . (iron)	6710	3260	26 0	280 2	56 5	Glasgow	Napier .	1864	237,438	45,764	4½	4½	..	18	2 8-in. 9-ton M.L.R., 16 7-in. 6½-ton do., 8 M., 5 l.	..	12·36	460	1460
c.b.	Hercules (iron)	8680	8500	26 6	325 0	59 0½	Chatham	Penn .	1868	278,320	82,814	9 to 6	6 & 5	..	12 & 10	8 10-in. 18-ton M.L.R., 2 9-in. 12½-ton do., 4 7-in. 6½-ton do., 6 4·7-in. Q.F., 9 6-pdr. do., 13 3-pr. do., 7 M., 3 l.	4 l. car.	14·00	610	1760
t.	Hero (steel) 2 s.	6200	6000	24 0	270 0	58 0	Chatham	Rennie .	1888	x 338,971	y 58,300	12 comp.	11½ comp.	12 comp.	13½ 2½–1¾″	2 12-in. 45-ton B.L.R., 4 6-in. 5-ton do., 7 6-pdr. Q.F., 5 3-pr. do., 6 M., 2 l.	6 l. car.	15·5	620	5200
t.	Hood (steel) 2 s.	14,150	13,000	27 6	380 0	75 0	Chatham	Humphrys	Bldg. Ld. 1891	Total. 864,911		18 comp. 4 above the belt.	17 Re-doubts comp.	18 comp.	.. 3″	4 67-ton B.L.R., 10 6-in. Q.F. and 25 other Q.F., 8 M., 2 l.	7 f. tu. or l. car.	17·5	900	5000

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c.s., *t.*	**Hotspur** (iron)	2 *s.*	4010	3060	21	10	235	0	50	0	Glasgow	Napier	1871	135,067	36,461	11 & 8	8 breast-work.	10 & 8½	15 to 10 2″–1″	2	25-ton M.L.R., 2 6-in. 81-cwt. B.L.R., 4 6-pdr. Q.F., 10 M., 2 l.	2 l. car.	12·8	300	920
b.	**Howe** (steel)	2 *s.*	10,300	11,500	27	3	325	0	68	0	Pembroke	Humphrys	1889	*x* 560,469	*y* 106,553	18 *comp.*	16 *comp.*	11½ to 10 on barbette. *comp.*	15 to 12 3″–2½″	4	13½-in. 67-ton B.L.R., 6 6-in. 5-ton do., 12 6-pdr. Q.F., 7 3-pr. do., 7 M., 2 l.	1 f. tu. 4 l. car.	16·75	1200	7200
c.s., *t.*	**Hydra** (iron)	2 *s.*	3560	1470	16	4	225	0	45	0	Glasgow	Elder	1872	124,454	16,918	8 & 6	9 & 8 on eastwork.	9 & 10	11 to 9 1½″	4	18-ton M.L.R., 4 3-pdr. Q.F., 5 M., 2 l.	..	11·00	250	1920
a.c.	**Immortalité.** (steel)	2 *s.*	5600	8500	22	6	300	0	56	0	Chatham	Earle	1889	*x* 221,500	*y* 57,000	10 *comp.*	16 *comp.*	12 conning tower. *comp.*	6 3″–2″	2	9·2-in. 22-ton B.L.R., 10 6-in. 89-cwt. do., 6 6-pdr. Q.F., 10 3-pr. do., 6 M., 3 l.	2 l. car.	18·50	900	8000
a.c.	**Impérieuse** . (steel) (Copper sheathed.)	2 *s.*	8400	10,000	27	4	315	0	62	0	Portsm'th	Maudslay	1886	*x* 417,437	*y* 113,377	10 *comp.*	9 *comp.*	8 on barbette. *comp.*	10 4″–2″	4	9·2-in. 24-ton B.L.R., 10 6-in. 89-cwt. do., 4 6-pdr. Q.F., 4 3-pr. do., 10 M., 2 l.	2 f. tu. 4 l. car.	16·75	1130	7000
t.	**Inflexible** (iron)	2 *s.*	11,880	8010	26	4	320	0	75	0	Portsm'th	Elder	1881	648,811	146,457	24, 20, 16	22, 18, 14	17 & 16 *comp.*	17 to 25 3″	4	16-in. 80-ton M.L.R., 8 4-in. 22-cwt. B.L.R., 4 6-pdr. Q.F., 3 3-pr. do., 14 M., 2 l.	2 f. tu. sub. 2 l. car.	13·80	1300	5200
c.b.	**Invincible** . (iron)	2 *s.*	6010	4830	23	2	280	0	54	0	Glasgow	Napier	1870	187,055	52,386	8 to 6	5	..	10	10	9-in. 12-ton M.L.R., 6 4-in. 22-cwt. B.L., 4 6-pdr. Q.F., 15 M., 4 l.	4 l. car.	14·09	500	1580
c.b.	**Iron Duke** . (iron)	2 *s.*	6010	3520	23	3	280	0	54	0	Pembroke	Ravenhill	1871	146,314	50,165	8 to 6	5	..	10	10	9-in. 12-ton M.L.R., 4 5-in. 38-cwt. B.L.R., 4 20-pdr. B.L.R., 4 6-pr. Q.F., 15 M., 3 l.	4 l. car.	13·64	700	3900
br.	**Minotaur** (iron)		10,690	5000	27	3	400	0	59	4¾	Blackwall	Penn	1867	377,325	79,505	5½	4½	..	10	17	9-in. 12-ton M.L.R., 4 4·7-in. Q.F., 8 3-pr. do., 8 M., 4 l.	2 l. car.	14·41	750	1200

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GREAT BRITAIN.—Armoured Ships—*continued.*

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M.L.R., muzzle-loading rifled gun: B.L.R., breech-loading rifled gun; l., light guns under 15 cwt., including boats' guns; Q.F., quick-firing gun; M., machine guns; *comp.*, compound or steel-faced armour; f. tu., l. car., fixed tube or launching carriage for Whitehead torpedo discharge.

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		tons.		ft. in.	ft. in.	ft. in.				£	£	in.	in.	in.	in.			knots.	tons.	knots.
t.	**Monarch** (iron)	8320	7840	26 7	330 0	57 6	Chatham	Humphrys	1869	279,903	74,672	7 to 6	5 & 4½	10 & 8	12	4 12-in. 25-ton M.L.R., 2 12-ton M.L.R., 1 6½-ton do., 4 6-pdr. Q.F., 2 3-pr. do., 16 M., 3 l.	2 l. car.	14·94	630	1500
a.c.	**Narcissus** . 2 *s.* (steel)	5600	8500	22 6	300 0	56 0	Hull	Earle	1889	*x* 195,890	*y* 61,500	10 *comp.*	16 *comp.*	12 conning tower. *comp.*	6 3"–2"	2 9·2-in. 22-ton B.L.R., 10 6-in. 5-ton B.L.R., 6 6-pdr. Q.F., 10 3-pr. do., 6 M., 3 l.	4 l. car.	18·50	900	8000
a.c.	**Nelson** (iron) 2 *s.* (Zinc sheathed.)	7630	6640	26 6	280 0	60 0	Glasgow	Elder	1880	303,310	87,545	9 & 6	9, 8, 6	9 conning tower.	13 to 10 3"–2"	4 10-in. 18-ton M.L.R., 8 9-in. 12-ton do, 4 4·7-in. Q.F., 6 6-pdr. do., 14 3-pr. do., 7 M., 3 l.	2 l. car.	14·41	1150	5200
t.	**Neptune** (iron) (Copper sheathed; was "Independencia.")	9310	8000	26 1	300 0	63 0	Poplar	Penn	1878	600,000 (purchased).		12 to 9	8 & 6	11 & 13	11 to 13 3"–2"	4 12½-in. 38-ton M.L.R., 2 9-in. 12-ton do., 6 6-pdr. Q.F., 8 3-pr. do., 11 M., 2 l.	2 l. car.	14·20	670	1480
..	New battleship .	..	Design not approved.				Chatham	..	..	..	..	..	..	..	..	.. ..	..	..	..	..
..	New battleship .	..	Design not approved.				Pembroke	..	..	..	..	..	..	..	..	.. ..	..	..	..	..
..	New battleship .	..	Design not approved.				Contract	..	..	..	..	..	..	..	..	.. ..	..	..	..	..

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t.	**Nile** (steel) 2 *s.*	11,940	12,000	27	6	345	0	73	0	Pembroke	Maudslay	1890	Total. 819,717		20 to 16 *comp.*	18 to 14 *comp.*	18 *comp.*	6 3″	4 13½-in. 67-ton B.L.R., 6 4·7-in. Q.F., 8 6-pdr. do., 9 3-pdr. do., 6 M., 3 l.	2 f. tu. 2 l. car.	16·50	1200	6500
a.c.	**Northampton** 2 *s.* (iron) (Zinc sheathed.)	7630	6070	25	9	280	0	60	0	Glasgow	Penn	1878	296,836	98,968	9 & 6	9, 8, 6	9 conning tower.	13, 10 3″–2″	4 10-in. 18-ton M.L.R., 8 9-in. 12-ton do., 6 6-pdr. Q.F., 8 3-pr. do., 10 M., 3 l.	2 l. car.	13·20	1150	3850
br.	**Northumberland** (iron)	10,780	6560	27	1	400	4	59	5	Millwall	Penn	1868	391,481	79,871	5½	4½	5½ conning tower.	10	7 9-in. 12-ton M.L.R., 20 8-in. 9-ton do., 1 6-in. 89-cwt. B.L.R., 1 5-in. 40-cwt. do., 6 4·7-in. Q.F., 4 3-pdr. do., 11 M., 13 l.	4 l. car.	14·13	756	1270
c.b.	**Orion** (iron) 2 *s.* (was "Boordji-Zaffer")	4870	4040	21	4	245	0	52	0	Poplar	Maudslay	1882	239,270	52,959	12, 10, 8, 7	9, 6, 5	9 conning tower.	16 & 9 3′–1″	4 12-in. 25-ton M.L.R., 6 6-pdr. Q.F., 8 M., 2 l.	4 l. car.	13·0	520	1830
a.c.	**Orlando** (steel) 2 *s.*	5600	8500	22	6	300	0	56	0	Jarrow	Palmer	1888	x 206,647	y 60,165	10 *comp.*	16 *comp.*	12 conning tower. *comp.*	6 3″–2″	2 9·2-in. 22-ton B.L.R., 10 6-in. 5-ton do., 6 6-pdr. Q.F., 10 3-pdr. do., 7 M., 3 l.	4 l. car.	18·5	900	8000
c b.	**Penelope** (iron) 2 *s.*	4470	4700	17	6	260	0	50	0	Pembroke	Maudslay	1868	145,993	40,855	6 & 5	4½	..	10 & 11	8 8-in. 9-ton M.L.R., 4 3-pdr. Q.F., 11 M., 4 l.	..	12·76	470	1360
c.s., t.	**Prince Albert** . (iron)	3880	2130	20	4	240	0	48	1	Poplar	Humphrys	1866	178,537	24,129	4½	..	10 & 5½	18 ¾″	4 9-in. 12-ton M.L.R. 6 M., 2 l.	..	11·65	230	930
b.	**Ramillies** . 2 *s.* (steel)	14,150	13,000	27	6	380	0	75	0	Glasgow	Thomson	Bldg. Ld. 1892	Total. 877,460		18 *comp.* 4 above the belt.	16 *comp.*	17 barbette. *comp.*	.. 3″	4 67-ton B.L.R., 10 6-in. Q.F. and 25 other Q.F., 8 M., 2 l.	7 f. tu. or l. car.	17·5	900	5000
b.	**Repulse** (steel) 2 *s.*	14,150	13,000	27	6	380	0	75	0	Pembroke	Humphrys	Bldg. Ld. 1892	Total. 849,553		18 *comp.* 4 above the belt.	16 *comp.*	17 barbette. *comp.*	.. 3″	4 67-ton B.L.R., 10 6-in. Q.F. and 25 other Q.F., 8 M., 2 l.	7 f. tu. or l. car.	17·5	900	5000

x Includes Hydraulic Machinery, Gun Mountings, &c

y Propelling Machinery.

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GREAT BRITAIN.—Armoured Ships—*continued.*

***a.c.*, armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t.*, turret-ship; 2 *s.*, two screws.**

M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; l., light guns under 15 cwt., including boats' guns; Q.F., quick-firing gun; M., machine gun; *comp.*, compound or steel-faced armour; f. tu., l. car., fixed tube or launching carriage for Whitehead torpedo discharge.

Class.	NAME.	Displacement.	Indicated Horse-Power.	Draught of Water. Extreme.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Completion.	Cost. Hull.	Cost. Machinery.	Armour. Side.	Armour. Bulkhead.	Armour. Turret.	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dischargers.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
		tons.		ft. in.	ft. in.	ft. in.				£	£	in.	in.	in.	in.			knots.	tons.	knots.
b.	**Resolution** . 2 *s.* (steel)	14,150	13,000	27 6	380 0	75 0	Jarrow .	Palmer .	Bldg.	Total. 852,755		18 *comp.* 4 above the belt.	16 *comp.*	17 barbette. *comp.*	.. 3″	4 67-ton B.L.R., 10 6-in. Q.F. and 25 other Q.F., 8 M., 2 l.	7 f. tu. or l. car.	17·5	900	5000
b.	**Revenge** . 2 *s.* (steel)	14,150	13,000	27 6	380 0	75 0	Jarrow .	Palmer .	Bldg.	Total. 852,755		18 *comp.* 4 above the belt.	16 *comp.*	17 barbette. *comp.*	.. 3″	4 67-ton B.L.R., 10 6-in. Q.F. and 25 other Q.F., 8 M., 2 l.	7 f. tu. or l. car.	17·5	900	5000
b.	**Rodney** (steel) 2 *s.*	10,300	11,500	27 3	325 0	68 0	Chatham	Humphrys	1888	*x* 563,878	*y* 105,400	18 *comp.*	16 *comp.*	11½ to 10 on barbette *comp.*	15 to 12 3″–2½″	1 13½-in. 69-ton B.L.R., 3 13½-in. 67-ton do., 6 6-in. 5-ton do., 12 6-pr. Q.F., 2 3-pr. do., 10 M., 2 l.	4 l. car.	16·75	1200	8500
b.	**Royal Oak** . 2 *s.* (steel)	14,150	13,000	27 6	380 0	75 0	Birkenh'd	Laird .	Bldg.	Total. 877,378		18 *comp.* 4 above the belt.	16 *comp.*	17 barbette. *comp.*	.. 3″	4 67-ton B.L.R., 10 6-in. Q.F. and 25 other Q.F., 8 M., 2 l.	7 f. tu. or l. car.	17·5	900	5000
b.	**Royal Sovereign** (steel) 2 *s.*	14,150	13,000	27 6	380 0	75 0	Portsm'th	Humphrys	Bldg. Ld. 1891	Total. 865,811		18 *comp.* 4 above the belt.	16 *comp.*	17 barbette. *comp.*	.. 3″	4 67-ton B.L.R., 10 6-in. Q.F. and 25 other Q.F., 8 M., 2 l.	7 f. tu. or l. car.	17·5	900	5000

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c.s., *t.*	**Rupert** (iron) 2 *s.*	5440	6000	23	7	250	0	53	0	Chatham	Napier	1874	193,171	39,506	11 & 9	12 breast-work.	14 & 12	14 & 10 3″–2″	2	9·2-in. 22-ton B.L.R., 2 6-in. 89-cwt. do., 4 6-pr. Q.F., 6 3-pr. do., 3 M., 2 l.	4 l. car.	13·59	480	1340
t.	**Sans Pareil** . 2 *s.* (steel)	10,470	14,000	27	3	340	0	70	0	Blackwall	Humphrys	1889	*x* 609,109	*y* 110,333	16 to 18 *comp.*	16 *comp.*	18 *comp.*	6 3″	2	16¼-in. 111-ton B.L.R., 1 10-in. 29-ton do., 12 6-in. 5-ton do., 12 6-pdr. Q.F., 9 3-pdr. do., 8 M., 2 l.	4 f. tu. 2 l. car.	16·75	1200	7000
c.s., *t.*	**Scorpion** (iron)	2750	1450	16	11	224	6	42	4½	Birkenh'd	Laird	1865	92,033	18,540	4½	..	5	10 to 8	4	9-in. 12-t. M.L.R., 6 M., 1 l.	..	10·51	320	1210
a.c.	**Shannon** (iron) (Zinc sheathed.)	5390	3370	23	4	260	0	54	0	Pembroke	Laird	1877	233,902	53,367	9, 8, 6	9 & 8	9 conning tower.	10 & 12 3″–1″	2	10-in. 18-ton M.L.R., 7 9-in. 12-ton do., 11 M., 8 l.	2 l. car.	12·35	580	2260
c.b.	**Sultan** . (iron)	9290	7720	27	6	325	0	59	0½	Chatham	Penn	1871	281,373	76,042	9, 8, 6	6 to 4½	..	12 & 10	8	10-in. 18-ton M.L.R., 4 9-in. 12½-ton M.L.R., 7 20-pdr. B.L.R., 4 6-pdr. Q.F., 13 M., 4 l.	4 l. car.	14·13	810	2140
c.b.	**Superb** . (iron) (was "Hamidyeh").	9170	6000	26	5	332	3	59	0	Blackwall	Maudslay	1880	443,000 (purchased)		12, 10, 7	10, 7, 6 5	8 on conning tower.	7 to 12 1½″	16	10-in. 18-ton M.L.R., 6 4-in. 22-cwt. B.L., 6 6-pdr. Q.F., 10 3-pdr. do., 6 M., 3 l.	4 l. car.	13·50	970	1810
c.b.	**Swiftsure** (iron) (Copper sheathed.)	6910	4910	26	0	280	0	55	0	Jarrow	Maudslay	1872	207,940	49,141	8 to 6	6, 5, 4	..	10	10	9-in. 12-ton M.L.R., 8 4-in. 22-cwt. B.L., 4 6-pr. Q.F., 4 3-pr. do., 12 M., 3 l.	4 l. car.	13·75	540	1630
c.b. & *b.*	**Temeraire** . 2 *s.* (iron) (Zinc sheathed.)	8540	7520	27	2	285	0	62	0	Chatham	Humphrys	1877	352,015	102,954	11, 10, 9, 8	8—5	10 fore 8 after barbette	12 & 10 1½″–1″	4	11-in. 25-ton M.L.R., 4 10-in. 18-ton do., 6 4-in. 22-cwt. B.L.R., 4 6-pdr. Q.F., 2 3-pr. do., 14 M., 3 l.	2 l. car.	14·50	620	2680

x Includes Hydraulic Machinery, Gun Mountings, &c.

y Propelling Machinery.

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GREAT BRITAIN.—Armoured Ships—*continued.*

a.c., armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t.*, turret-ship; 2 *s.*, two screws.

M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; l., light guns under 15 cwt., including boats' guns: Q.F., quick-firing gun; M., machine gun; *comp.*, compound or steel-faced armour; f. tu., l. car., fixed tube or launching carriage for Whitehead torpedo discharge.

Class.	NAME.	Displacement.	Indicated Horse-Power.	Draught of Water. Extreme.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Completion.	Cost.		Armour.			Backing.	Armament.		Speed.	Coal Endurance.	
										Hull.	Machinery.	Side.	Bulkhead.	Turret.	Deck Plating.	Guns.	Fish Torpedo Dischargers.		Cols that can be carried in Bunkers.	Distance that can be steamed at 10 knots speed.
		tons.		ft. in.	ft. in.	ft. in.				£	£	in.	in.	in.	in.			knots.	tons.	knots.
t.	**Thunderer** . 2 *s.* (iron)	9330	7000	27 0	285 0	62 3	Pembroke	Maudslay (new engine)	1877	306,084	52,458	12 & 10	12 & 10 breast-work.	14 & 12	18 to 16 3″–2″	4 10-in. 29-ton B.L.R., 6 6-pdr. Q.F., 8 3-pr. do., 4 M., 2 l.	2 l. car.	13·40	1600	3040
t.	**Trafalgar** . 2 *s.* (steel)	11,940	12,000	27 6	345 0	73 0	Portsm'th	Humphrys	1890	*x* 765,794	*y* 97,000	20 to 16 *comp.*	18 to 14 *comp.*	18 *comp.*	6 3″	4 13½-in. 67-ton B.L.R., 6 4·7-in. Q.F., 8 6-pdr. do., 9 3-pdr. do., 7 M. 3 l.	4 f. tu. 2 l. car.	16·50	1200	6500
c.b.	**Triumph** . (iron) (Copper sheathed.)	6640	5110	26 2	280 0	55 0	Jarrow	Maudslay	1873	209,109	49,213	8 to 6	6, 5, 4	..	10	10 9-in. 12-ton M.L.R., 4 5-in. 40-cwt. B.L.R., 8 6-pdr. Q.F., 8 3-pdr. do., 5 M., 3 l.	4 l. car.	13·75	550	1680
a.c.	**Undaunted** 2 *s.* (steel)	5600	8500	22 6	300 0	56 0	Jarrow	Palmer Co.	1889	*x* 195,890	*y* 60,165	10 *comp.*	16 *comp.*	12 conning tower. *comp.*	6 3″–2″	2 9·2-in. 22-ton B.L.R., 10 6-in. 5-ton do., 6 6-pdr. Q.F., 10 3-pdr. do., 6 M., 3 l.	4 l. car.	18·5	900	8000
br.	**Valiant** . (iron) (Harbour Service.)	6710	3350	26 8	280 2	56 4	Poplar	Maudslay	1865	271,964	48,324	4½	4½	..	18	2 8-in. 9-ton. M.L.R., 16 7-in. 6½-ton do., 8 M., 4 l.	..	12·65	450	1430

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t.	**Victoria** (steel) 2 *s.* (Was "Renown.")	10,470	14,000	27	3	340	0	70	0	Newcastle	Humphrys	1890	612,522	112,333	16 to 18 *comp.*	16 *comp.*	18 *comp.*	6 3″	2 16¼-in. 111-ton B.L.R., 1 10-in. 29-ton do., 12 6-in. 5-ton do., 12 6-pdr. Q.F., 9 3-pdr. do., 8 M., 2 l.	4 f. tu. 2 l. car.	16·75	1200	7000
a.g. b.	**Viper** (iron) 2 *s.* (Coast Defence.)	1230	700	11	8	160	0	32	0	Poplar	Maudslay	1867	43,517	7,610	4½	4½	..	10	2 6½-ton M.L.R., 2 l.	..	9·59	110	..
a.g. b.	**Vixen** . . 2 *s.* (Composite.) (Coast Defence.)	1230	740	11	8	160	0	32	5	Deptford Green	Maudslay	1866	46,333	7,860	4½	4½	..	10	2 6½-ton M.L.R., 2 l.	..	8·89	110	..
br.	**Warrior** . (iron)	9210	5270	26	9	380	2	58	4	Blackwall	Penn	1861	282,284	74,409	4½	4½	..	18 to 10	4 8-in. 9-ton M.L.R., 28 7-in. 6½ do., 8 M., 4 l.	..	14·40	790	1210
a.c.	**Warspite** . 2 *s.* (Copper sheathed.)	8400	10,000	27	4	315	0	62	0	Chatham	Penn	1888	*x* 415,546	*y* 113,786	10 *comp.*	9 *comp.*	8 barbette.	10 4″–2″	4 9·2-in. 22-ton B.L.R., 10 6-in. 89-cwt. do., 4 6-pdr. Q.F., 4 3-pdr. do., 10 M., 2 l.	2 f. tu. 4 l. car.	16·75	1130	7000
c.s., t.	**Wivern** . (iron)	2750	1450	17	0	224	6	42	4	Birkenh'd	Laird	1865	98,118	18,396	4½	..	5	8 to 10	4 9-in. 12-ton M.L.R., 8 M., 1 l.	..	10·06	300	1150
The following, which appear in the Official Navy List, belong to India and Australia:—																On breast-work.							
c.s., t.	**Abyssinia*** (iron) 2 *s.* (*Indian Marine.*)	2900	950	14	6	225	0	42	0	Poplar	Dudgeon	1870	97,049	19,500	7 & 6	8 & 7 Do.	10 & 8	11 to 9 1½″–1″	4 10-in. 18-ton M.L.R., 2 M., 2 l. *a*	..	9·59	92	..
c.s., t.	**Cerberus†** (iron) 2 *s.* (*Colonial Marine.*)	3480	1370	15	3	225	0	45	0	Jarrow	Maudslay	1870	99,331	18,225	8 to 6	9 to 8 Do.	10 & 9	11 to 9 1½′–1″	4 10-in. 18-ton M.L.R., 4 M., 2 l.	..	9·75	120	..
c.s., t.	**Magdala*** (iron) 2 *s.* (*Indian Marine.*)	3340	1440	15	3	225	0	45	0	Blackwall	Ravenhill	1870	115,400	17,000	8 to 6	9 to 8	10 & 9	11 to 9 1½″–1″	4 10-in. 18-ton M.L.R., 2 M., 2 l. *a*	..	10·67	120	..

x Includes Hydraulic Machinery, Gun Mountings, &c.
* At Bombay.
y Propelling Machinery.
a These guns are to be replaced by 4 8-in. 14-ton B.L.R.
† At Melbourne.

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GREAT BRITAIN.—Unarmoured Cruising Ships, &c.

comp., composite hull; 2 *s.*, two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; Q.F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns; f. tu., fixed torpedo-tube; l. car., launching torpedo carriage; P., deck protected throughout; pp., deck protected amidships. The thickness of the protecting decks in inches is given under the letters P. or pp.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			Tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Sloop	Acorn	*Comp.*	970	1380	14 0	167 0	32 0	Milford Haven	Maudslay	1884	27,500	14,500	8 5-in. 38-cwt. B.L.R., 8 M., 1 l.	..	12·2	150	1900
Cruiser (2nd class)	Active	Iron wood and copper sheathed	3080	4130	21 4	270 0	42 0	Blackwall	Humphrys	1869	85,795	40,361	10 6-in. 81-cwt. B.L.R., 2 64-pdrs. M.L.R., 9 M., 2 l.	2 l. car.	15·10	410	2000
" " P. 2″–1″	Æolus	2 *s.* Steel wood and copper sheathed.	3600	9000	17 6	300 0	43 0	Devonp'rt	Hawthorn	1891	Total. 207,724		2 6-in. Q.F., 6 4·7-in. do., 8 6-pdr. do., 1 3 pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·75	400	8000
Desp. Vessel	Alacrity	2 *s.* Steel	1700	3180	14 0	250 0	32 6	Jarrow	Palmer	1885	*x* 48,289	*y* 29,680	4 5-in. 38-cwt. B.L.R., 4 6-pdr. Q.F., 2 M.	..	17·00	400	6450
1st Class Torpedo Gun Boat	Alarm	2 *s.* Steel	810	3500	8 9	230 0	27 0	Sheerness	Penn	Bldg.	Total. 59,346		2 4·7-in. Q.F., 4 3-pdr. do.	1 f. tu. 2 l. car.	19·25	100	2500
Gun Boat (2nd class)	Albacore	*Comp.*	560	660	10 6	135 0	26 0	Birkenh'd	Laird	1883	18,000	10,556	2 5-in. 38-cwt. B.L.R., 2 4-in. 22-cwt. do., 2 M.	..	11·0	85	..
Cruiser (2nd class)	Amphion	pp. 1½″ 2 *s.* Steel	4300	5550	20 6	300 0	46 0	Pembroke	Maudslay	1883	95,000	65,500	10 6-in. 5-ton B.L.R., 4 3-pdr. Q.F., 12 M., 2 l.	4 l. car.	17·00	1000	11,000
" " P. 2″–1″	Andromache	2 *s.* Steel	3400	9000	16 6	300 0	43 0	Chatham	Earle	1890	Total. 186,280		2 6-in. B.L.R., 6 4·7-in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	20·0	400	8000

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1st class or Torpedo Gun Boat	Antelope	2 s.	Steel	810	3500	8	9	230	0	27	0	Devonp'rt	Yarrow	Bldg.	Total. 61,397		2 4·7-in. Q.F., 4 3-pdr. do.	1 f. tu. 2 l. car.	19·25	100	..
Cruiser (2nd class)	Apollo	P. 2″–1″	Steel	3400	9000	16	6	300	0	43	0	Chatham	Earle	1891	Total. 186,361		2 6-in. B.L.R., 6 4·7-in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	20·0	400	8000
Cruiser (3rd class)	Archer	2 s.	Steel	1770	3500	14	6	225	0	36	0	Glasgow	Thomson	1885	x 55,916	y 31,667	6 6-in. 5-ton B.L.R., 8 3-pr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	17·00	475	7000
Cruiser (2nd class)	Arethusa	pp. 1½″	Steel	4300	5500	20	6	300	0	46	0	Glasgow	Napier	1882	86,763	58,435	10 6-in. 89-cwt. B.L.R., 4 3-pdr. Q.F., 13 M., 2 l.	4 l. car.	17·00	1000	11,000
" "	Astrea	P. 2″–1″	Steel copper sheathed	4360	9000	19	0	320	0	49	6	Devonp'rt	Devonport	Bldg.	Total. 244,831		2 6-in. Q.F., 8 4·7-in. do., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·5	400	..
" "	Bacchante		Iron zinc sheathed	4130	5420	23	9	280	0	45	6	Portsm'th	Rennie	1876	152,454	76,954	4 6-in. B.L.R., 10 90-cwt. M.L.R., 12 M., 8 l.	2 l. car.	15·06	570	4070
Gun Boat (2nd class)	Banterer		*Comp.*	465	440	10	0	125	0	23	6	Barrow	Barrow	1880	15,600	5,300	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·8	40	..
Cruiser (3rd class)	Barham	P. 2″–1″	Steel	1830	(a) 3600	13	3	280	0	35	0	Portsm'th	Hawthorn	1889	Total. 113,302		6 4·7-in. Q.F., 4 3-pdr. do., 2 M.	2 l. car.	16·5	140	2600
" "	Barracouta	P. 2″–1″	Steel	1580	1900	14	0	220	0	35	0	Sheerness	Palmer	1889	Total. 96,615		6 4·7-in. Q.F., 4 3-pdr. do., 2 M.	2 l. car.	16·5	160	3400
" "	Barrosa	P. 2″–1″	Steel	1580	3000	14	0	220	0	35	0	Portsm'th	Palmer	1889	Total. 79,238		6 4·7-in. Q.F., 4 3-pdr. do., 2 M.	2 l. car.	16·5	160	3400
Sloop	Basilisk	2 s.	Steel copper sheathed	1170	2000	12	6	195	0	28	0	Sheerness	Rennie	1889	Total. 58,013		8 5-in. 40-cwt., B.L.R., 8 M.	..	14·5	160	3000
"	Beagle	2 s.	Steel copper sheathed	1170	2000	12	6	195	0	28	0	Portsm'th	Rennie	1889	Total. 56,474		8 5-in. 40-cwt., B.L.R., 8 M.	..	14·5	160	3000
Cruiser (3rd class)	Bellona	P. 2″–1″	Steel	1830	(a) 3600	13	3	280	0	35	0	Newcastle	Hawthorn	1890	Total. 94,195		6 4·7-in. Q.F., 4 3-pdr. do., 2 M.	2 l. car	16·5	140	2600
Cruiser (1st class)	Blake	P. 6″–3″	Steel	9000	(b) 14,450	25	9	375	0	65	0	Chatham	Maudslay	1889	Total. 440,471		2 9·2-in. 22-ton B.L.R., 10 6-in. 5-ton do., 16 3-pdr. Q.F., 7 M., 2 l.	2 f. tu. submerged 2 l. car	(b) 19·12	1500	15,000
Cruiser (3rd class)	Blanche	P. 2″–1″	Steel copper sheathed	1580	3000	14	0	220	0	35	0	Pembroke	Earle	1889	Total. 91,112		6 4·7-in. Q.F., 4 3-pdr. do., 2 M.	2 l. car.	16·5	160	3400

s Includes Gun Mountings, &c. v Propelling Machinery. (a) Natural draught. The estimated horse-power with forced draught was 6000, and the speed 19·5 knots.
(b) Natural draught. This trial was made in shallow water. The estimated horse-power with forced draught was 20,000, and the speed 22 knots.

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GREAT BRITAIN.—Unarmoured Cruising Ships, &c.

comp., composite hull; 2 *s.*, two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; Q.F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns; f. tu. or b. tu., fixed or bow torpedo tube; l. car., launching torpedo carriage; P., deck protected; pp., partial deck protected. The thickness of the protecting decks in inches is given under the letters P. or pp.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Speed.	Coal Endurance. Coal that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.	(a)	ft. in.	ft. in.	ft. in.				£ Total.	£			knots.	tons.	knots.
Cruiser . P. (1st class) 6″–3″	Blenheim 2 *s.*	Steel	9000	14,924	25 9	375 0	65 0	Thames Ironworks	Humphrys	1890	425,591		2 9·2-in. 22-ton B.L.R., 10 6-in. do., 16 3-pdr. Q.F., 7 M., 2 l.	2 f. tu. submerged 2 l. car.	20·4	1500	15,000
Cruiser . P. (3rd class) 2″–1″	Blonde . 2 *s.*	Steel copper sheathed	1580	2800	14 0	220 0	35 0	Pembroke	Earle .	1889	Total. 90,059		6 4·7-in. Q.F., 4-3-pdr. do., 2 M.	2 l. car.	16·5	160	3400
Cruiser . . (2nd class)	Boadicea .	Iron copper sheathed	4140	5130	23 8	280 0	45 0	Portsm'th	Rennie .	1875	153,167	70,409	2 6-in. 5-ton B.L.R., 12 90-cwt. M.L.R., 4 6-pdr. Q.F., 2 3-pdr. do., 10 M., 2 l.	2 l. car.	14·70	570	3000
" " P. 2″–1″	Bonaventure . 2 *s.*	Steel copper sheathed	4360	9000	19 0	320 0	49 6	Devonp'rt	Hawthorn.	Bldg.	Total. 237,262		2 6-in. Q.F., 8 4·7-in. do., 8 6-pdr. do., 1 3-pr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·5	400	..
1st Class or Torpedo Gun Boat	Boomerang 2 *s.* (Special for Australia)	Steel	770	(b) 3500	8 3	230 0	27 0	Elswick .	Bellis .	1889	Total. 49,962		2 4·7-in. Q.F., 4 3-pdr. do., 1 M.	1 f. tu. 2 l. car.	20·00	100	2500
Gun Boat . . (1st class)	Bramble . 2 *s.*	*Comp.*	715	1000	11 0	165 0	29 0	Belfast .	Harland .	1886	39,835	10,000	6 4-in. 25-cwt. B.L.R., 4 M.	..	13·0	105	2500
Cruiser . P. (2nd class) 2″–1″	Brilliant . 2 *s.*	Steel copper sheathed.	3600	9000	17 6	300 0	43 8	Sheerness	Hawthorn.	1891	Total. 204.228		2 6-in. Q.F., 6 4·7 in. do., 8 6-pdr. do., 1 3-pr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·75	400	8000
Cruiser . . (3rd class)	Brisk . 2 *s.*	Steel	1770	3500	14 3½	225 0	36 0	Glasgow .	Thomson .	1886	55,916	31,667	6 6-in. 5-ton B.L.R.. 8 3-pdr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	17·00	325	4850
Gun Boat . . (2nd class)	Bullfrog . 1 *s.*	*Comp.*	465	420	9 6	125 0	23 6	Pembroke	Maudslay .	1881	16,300	6,050	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·8	40	..

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Sloop . .	Buzzard .	2 s.	*Comp.*	1140	2000	11	6	195 0	28 0	Sheerness	Barrow .	1887	42,500	16,200	8 5-in. 40-cwt. B.L.R. guns, 8 M.	..	14·50 (c)	160	3000
Cruiser . (3rd class)	pp. 1½″	Calliope . .	Steel copper sheathed	2770	4020	19	11	235 0	4 6	Portsm'th	Rennie .	1884	82,000	38,000	4 6-in. 5-ton B.L.R., 12 5-in. 38-cwt. do., 10 M., 2 l.	2 l. car.	13·75	550	4000
„ „	pp. 1½″	Calypso . .	Steel Do.	2770	3720	19	11	235 0	44 6	Chatham	Rennie .	1883	82,000	37,500	4 6-in. 5-ton B.L.R., 12 5-in. 38-cwt. do., 10 M., 2 l.	2 l. car.	13·75	550	4000
Cruiser . (2nd class)	P. 2″–1″	Cambrian	2 s.	Steel Do.	4360	9000	19	0	320 0	49 6	Pembroke	Hawthorn .	Bldg.	Total. 221,505	2 6-in. Q.F., 8 4·7-in. do., 8 6-pdr. do., 1 3-pr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·5	400	..
Cruiser . (3rd class)	pp. 1½″	Canada . .	Steel Do.	2380	2430	19	1	225 0	44 6	Portsm'th	Rennie .	1881	78,000	26,500	10 6-in. 5-ton B.L.R., 8 M., 2 l.	2 l. car.	13·00	470	5400
„ „	pp. 1¼″	Caroline . .	*Comp.*	1420	1440	15	9	200 0	38 0	Sheerness	Maudslay .	1882	56,000	15,000	14 5-in. 38-cwt. B.L.R., 8 M., 2 l.	..	13·10	400	6400
„ „	pp. 1½″	Carysfort. .	Steel copper sheathed	2380	2400	19	3	225 0	44 6	Glasgow .	Elder .	1878	84,512	29,942	2 90-cwt. M.L.R., 12 64-pdr. do., 6 M., 2 l.	2 l. car.	12·96	470	3840
„ „	pp. 1½″	Champion .	Steel copper sheathed	2380	2340	19	3	225 0	44 6	Glasgow .	Elder .	1878	84,288	29,695	4 6-in. 89-cwt. B.L.R., 8 5-in. 40-cwt. do., 4 3-pdr. Q.F., 6 M., 2 l.	2 l. car.	13·00	470	3840
Cruiser . (2nd class)	P. 2″–1″	Charybdis .	Steel copper sheathed	4360	9000	19	0	320 0	49 6	Sheerness	Earle .	Bldg.	Total. 234,166	2 6-in. Q.F., 8 4·7-in do., 8 6-pdr. do., 1 3-pr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·5	400	..
1st Class or Torpedo Gun Boat		Circe .	2 s.	Steel	810	3500	8	9	230 0	27 0	Sheerness	Penn .	Bldg.	Total. 62,008	2 4·7-in. Q.F., 4 3-pdr. do.	1 f. tu., 2 l. car.	19·25	100	2500
Cruiser . (3rd class)	pp. 1½″	Cleopatra .	Steel copper sheathed	2380	2610	19	3	225 0	44 6	Glasgow .	Humphrys	1878	86,126	27,798	4 6-in. 89-cwt. B.L.R., 8 5-in. 40-cwt. do., 4 3-pdr. Q.F. 6 M., 2 l.	2 l. car.	13·00	470	3280
Gun Boat . . (2nd class)		Cockchafer .	*Comp.*	465	470	9	6	125 0	23 6	Pembroke	Maudslay .	1881	16,000	61,000	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·8	40	..
Cruiser . (3rd class)	pp. 1½″	Comus . .	Steel copper sheathed	2380	2450	19	3	225 0	44 6	Glasgow .	Elder .	1878	84,497	29,477	4 6-in. 81-cwt. B.L.R., 8 64-pdr. M.L.R., 8 M., 2 l.	2 l. car.	12·93	470	3800
„ „	pp. 1½″	Conquest. .	Steel copper sheathed	2380	2670	19	3	225 0	44 6	Glasgow .	Humphrys	1878	83,707	27,205	2 90-cwt. M.L.R., 12 64-pdr. do., 6 M., 2 l.	2 l. car.	13·00	470	3280
„ „	pp. 1½″	Constance .	Steel Do.	2380	2590	19	3	225 0	44 6	Chatham.	Penn .	1880	78,000	32,000	2 90-cwt. M.L.R., 12 64-pdr. do., 6 M., 2 l.	2 l. car.	13·72	470	5000

x Includes Gun Mountings, &c. y Propelling Machinery. (a) Natural draught. The horse-power with forced draught was expected to be 20,000, and the speed 22 knots.
(b) Natural draught. The horse-power with forced draught was intended to be 4500, and the speed 21 knots. (c) After refit is reported to have made 15 knots.

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GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

comp., composite hull; 2 *s.*, two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; Q.F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns; f. tu. or b. tu., fixed or bow torpedo-tube; l. car., launching torpedo carriage; P., deck protected; pp., partial deck protected. The thickness of the protecting decks in inches is given under the letters P. or pp.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Cruiser . pp. (3rd class) 1½"	Cordelia . .	Steel Do.	2380	2420	19 3	225 0	44 6	Portsm'th	Rennie .	1881	78,000	26,500	10 6-in. 81-cwt. B.L.R., 10 M., 2 l.	2 l. car.	13·00	470	5400
Sloop . .	Cormorant .	*Comp.*	1130	950	15 3	170 0	36 0	Chatham.	Humphrys	1877	37,630	11,587	2 90-cwt. M.L.R., 4 64-cwt., 64-pdr. M.L.R., 4 M., 1 l.	..	11·31	150	1500
Cruiser . . (3rd class)	Cossack . 2 *s.*	Steel	1770	3500	14 3½	225 0	36 0	Glasgow .	Thomson .	1886	*x* 55,916	*y* 31,667	6 6-in. 5-ton B.L.R., 8 3-pdr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	17·00	325	4850
Cruiser . P. (1st class) 5"–1"	Crescent . 2 *s.*	Steel copper sheathed	7700	12,000	23 9	360 0	60 0	Portsm'th	Penn .	1892	Total. 377,474		1 9·2-in. 22-ton B.L.R., 12 6-in. Q.F., 12 6-pdr. and 5 3-pdr. do., 7 M., 2 l.	4 f. tu. or l.car 2 sub-merged	19·5	850	10,000
Cruiser . pp. (3rd class) 1½"	Curaçoa . .	Steel copper sheathed	2380	2540	19 3	225 0	44 6	Glasgow .	Humphrys	1878	85,833	27,098	4 6-in. 5-ton B.L.R., 8 5-in. 40-cwt. do., 1 3-pdr. Q.F., 9 M., 2 l.	2 l. car.	13·00	470	3280
Gun Vessel . . (1st class)	Curlew . 2 *s.*	Steel	950	1500	10 6	195 0	28 0	Devonp'rt	Penn .	1885	*x* 37,363	*y* 12,600	1 6-in. 5-ton B.L.R., 3 5-in. 38-cwt. B.L.R., 7 M.	1 b. tu. 2 l. car.	14·5	250	10,000
Sloop . . .	Daphne . 2 *s.*	*Comp.*	1140	2000	11 6	195 0	28 0	Sheerness	Greenock F'ndry Co.	1888	*x* 42,400	*y* 15,200	8 5-inch 40-cwt. B.L.R., 8 M. .	..	14·5	160	..
Surveying Vessel	Dart . .	Wood	470	200	11 6	133 0	25 2	Barrow .	Barrow .	..	Purchased Total. 6,900		2 M., 2 l.	..	..	64	..
Sloop . . .	Dolphin . .	*Comp.*	925	720	14 0	157 0	32 0	Middl'sbro	Hawthorn.	1882	25,850	9,800	2 6-in. 81-cwt. B.L.R., 2 5-in. 36-cwt. B.L.R., 2 M., 1 l.	..	11·30	135	1700
1st Class or Torpedo Gun Boat	Dryad . .	Steel	1070	3500	..	250 0	30 6	Chatham	..	Bldg.	..	..	2 4·7-in. Q.F., 4 3-pdr. do. .	5 f. tu. or l.car	19·00	100	2800

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					(a)													(a)		
Cruiser . P. (1st class) 5″–1″	Edgar . 2 s.	Steel	7350	13,260	23	9	360 0	60 0	Devonp'rt	Elder .	1890	Total. 398,340		2 9·2-in. 22-ton B.L.R., 10 6-in. Q.F., 12 6-pdr. do., 5 3-pdr. do., 7 M., 2 l.	4 f. tu. 2 submerged or l.car	20·50	850	10,000
Sloop . . .	Egeria (Surveying Service).	*Comp.*	940	1010	14	3	160 0	31 4	Pembroke	Humphrys	1873	32,468	10,414	4 20-pdr. B.L.R., 2 M., 1 l.	..	11·30	100	1000
Gun Vessel .	Elk (Coast Guard Service) 2 s.	*Comp.*	603	470	8	9	155 0	25 0	Portsm'th	Penn .	1868	16,107	5,775	1 90-cwt. M.L.R., 1 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·25	100	..
Cruiser . . (3rd class)	Emerald . .	*Comp.*	2120	2170	19	0	220 0	40 0	Pembroke	Thomson .	1876	72,312	26,130	4 6-in. 81-cwt. B.L.R., 8 5-in. 38 cwt. do., 7 M., 2 l.	..	13·20	250	2280
Cruiser . P. (1st Class) 5″–1″	Endymion 2 s.	Steel	7350	12,000	23	9	360 0	60 0	Hull .	Earle .	1891	Total. 346,520		2 9·2-in. 22-ton B.L.R., 10 6-in. Q.F., 12 6-pdr., do., 5 3-pdr. do., 7 M., 2 l.	2 f. tu. sub-merged 2 l. car.	19·75	850	10,000
Sloop . . .	Espiegle . .	*Comp.*	1130	1140	16	3	170 0	36 0	Devonp'rt	Maudslay .	1880	37,000	11,770	10 5-in. 40-cwt. B.L.R., 8 M., 1 l.	..	11·5	150	1480
Gun Boat . . (2nd class)	Espoir . .	*Comp.*	465	470	10	0	125 0	23 6	Barrow .	Barrow .	1880	15,643	5,610	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·8	40	..
Cruiser . . (2nd class)	Euryalus. .	Iron zinc sheathed	4140	5110	25	3	280 0	45 6	Chatham.	Easton and Anderson	1877	132,254	76,959	2 6-in. B.L.R., 12 90-cwt. M.L.R., 4 6-pdr. Q.F., 11 M., 3 l.	2 l. car.	14·72	550	2080
Cruiser . . (3rd class)	Fearless . 2 s.	Steel	1580	3200	14	6	220 0	34 3	Barrow .	Barrow .	1886	x64,202	23,250	4 5-in. 40-cwt. B.L.R., 8 3-pdr. Q.F., 2 M., 1 l.	3 f. tu. 1 sub-merged 4 l. car.	17·27	450	6900
Gun Boat . . (2nd class)	Firebrand .	*Comp.*	455	460	10	0	125 0	23 6	Glasgow .	Thomson .	1877	16,500	6,300	2 5-in. 38-cwt. B.L.R., 2 4-in. 22-cwt. do., 2 M.	..	10·17	40	..
„ „ .	Firefly . .	*Comp.*	455	470	10	0	125 0	23 6	Glasgow .	Thomson .	1877	16,400	6,300	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·99	40	..
„ „ .	Firm . .	*Comp.*	455	510	10	0	125 0	23 6	Hull .	Earle .	1877	16,550	6,080	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	10·2	40	..
Cruiser . P. (2nd class) 2″–1″	Flora . .	Steel copper sheathed	4360	9000	19	0	320 0	49 6	Pembroke	Barrow .	Bldg.	Total. 218,329		2 6-in. Q.F., 8 4·7-in. do., 8 6-pdr., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·5	400	..

x Includes Gun Mountings, &c. y Propelling Machinery. (a) Between Plymouth and Falmouth 20·97 knots for 4 hours with 12,550 H.P.

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GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

comp. composite hull; 2 *s.*, two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; Q.F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns; f. tu. or b. tu., fixed or bow torpedo tube; l. car., launching torpedo carriage; P., deck protected; pp., partial deck protected. The thickness of the protecting decks in inches is given under the letters P. or pp.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Gun Boat . . (2nd class)	Forester . .	*Comp.*	455	480	10 0	125 0	23 6	Earle .	Earle .	1877	16,500	6,100	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	10·1	40	..
Cruiser . P. (2nd class) 2″–1″	Forte . .	Steel copper sheathed	4360	9000	19 0	320 0	49 6	Chatham	Chatham .	Bldg.	Total. 224,367		2 6-in. Q.F., 8 4·7-in. do., 8 6-pdr., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·5	400	..
" " P. 3″–2″	Forth . 2 *s.*	Steel	4050	5700	20 0	300 0	46 0	Pembroke	Hawthorn.	1886	151,952	50,000	2 8-inch 15-ton B.L.R., 10 6-in. 5-ton B.L.R., 3 6-pdr. Q.F., 2 3-pdr. do., 10 M., 2 l.	2 l. car.	18·00	900	8750
" " P. 2″–1″	Fox . . .	Steel copper sheathed	4360	9000	19 0	320 0	49 6	Portsm'th	Portsm'th	1891	Total. 231,106		2 6-in. Q.F., 8 4·7-in. do., 8 6-pdr., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·5	400	..
Gun Boat . . (2nd class)	Foxhound .	*Comp.*	455	470	10 0	125 0	23 6	Barrow .	Hawthorn.	1877	14,150	6,550	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·6	40	..
Sloop . . .	Gannet . .	*Comp.*	1130	1110	15 9	170 0	36 0	Sheerness	Humphrys	1878	39,581	12,889	2 90-cwt. M.L.R., 3 64-pdr. do., 2 5-in. 38-cwt. B.L.R., 6 M., 1 l.	..	11·53	150	1480
Cruiser . . (3rd class)	Garnet . .	*Comp.*	2120	2000	19 7	220 0	40 0	Chatham.	Hawthorn.	1877	64,689	27,779	14 5-in. 40-cwt. B.L.R., 7 M., 2 l.	..	13·00	260	2000
Cruiser . P. (1st class) 5″–1″	Gibraltar 2 *s.*	Steel copper sheathed	7700	12,000	23 9	360 0	60 0	Glasgow .	Napier .	Bldg.	Total. 342,524		2 9-in. 22-ton B.L.R., 10 6-in. Q.F., 12 6-pdr. do., 5 3-pdr. do., 7 M., 2 l.	4 f. tu. or l. car 2 sub-merged.	19·5	850	10,000
1st Class or Tor-pedo Gun Boat	Gleaner . .	Steel	770	(*a*) 3632	8 3	230 0	27 0	Sheerness	Sheerness	1890	Total. 63,798		2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car.	(*a*) 20·1	100	2500

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Gun Boat . . (1st class)	Goldfinch .		*Comp.*	805	1200	11	7½	165 0	31 0	Sheerness	Sheerness	1889	Total. 40,889		6 4-in. 25-cwt. B.L.R., 2 3-pdr. Q.F., 2 M.	..	13·0	105	2500
Gun Boat . . (2nd class)	Goshawk .		*Comp.*	430	480	10	0	125 0	22 6	Pembroke	Maudslay .	1872	10,550	3,870	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	10·24	40	..
1st Class or Torpedo Gun Boat	Gossamer .		Steel	770	(*a*) 3600	8	3	230 0	27 0	Sheerness	Sheerness	1890	Total. 54,490		2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car.	(*a*) 19·8	100	2500
Cruiser . P. (1st class) 5″–1″	Grafton .	2 *s.*	Steel	7350	12,000	23	9	360 0	60 0	Blackwall	Humphrys	1892	Total. 343,780		2 9·2-in. 22-ton B.L.R., 10 6-in. Q.F., 12 6-pdr. do., 5 3-pdr. do, 7 M., 2 l.	4 f. tu. or l. car 2 submerged.	19·75	850	10,000
Gun Boat . . (2nd class)	Grappler .		*Comp.*	465	440	10	0	125 0	23 6	Barrow .	Barrow .	1880	15,600	5,250	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·8	..	..
1st Class or Torpedo Gun Boat	Grasshopper	2 *s.*	Steel	525	3000	8	9	200 0	23 0	Sheerness	Maudslay	1887	*x*20,897	*y*13,168	1 4-in. 25-cwt. B.L.R., 6 3-pdr. Q.F.	2 f. tu. 2 l. car.	19·00	80	2400
" "	Halcyon .	2 *s.*	Steel	1070	3500	9	0	250 0	30 6	Devonp'rt	..	Bldg.	..	..	2 4·7-in. Q.F., 4 3-pdr. do. .	5 f. tu. or l. car	19·00	100	2500
" "	Harrier .	2 *s.*	Steel	1070	3500	9	0	250 0	30 6	Devonp'rt	..	Bldg.	..	..	2 4·7-in. Q.F., 4 3-pdr. do. .	5 f. tu. or l. car	19·00	100	2500
Cruiser . P. (1st class) 5″–1″	Hawke .	2 *s.*	Steel	7350	12,000	23	9	360 0	60 0	Chatham.	Elder .	1891	Total. 365,491		2 9·2-in. 22-ton B.L.R., 10 6-in. Q.F., 12 6-pdr. do., 5 3-pdr. do., 7 M., 2 l.	2 f. tu. submerged. 2 l. car.	(*b*) 19·75	850	10,000
1st Class or Torpedo Gun Boat	Hazard .	2 *s.*	Steel	1070	3500	9	0	250 0	30 6	Pembroke	..	Bldg.	..	..	2 4·7-in. Q.F., 4 3-pdr. do.	5 f. tu. or l. car	19·00	100	2500
" "	Hebe .	2 *s.*	Steel	810	3500	8	9	230 0	27 0	Sheerness	Sheerness	Bldg.	Total. 68,062		2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car.	19.25	100	2500
Torpedo Depôt Ship.	Hecla . .		Iron	6400	2260	24	3	391 7	38 9	(Purchased) Built and Engined by Harland & Wolff.		1878	Total. 126,190		4 64-pdr. M.L.R., 1 5-in. 38-cwt. B.L.R, 1 40-pdr. B.L.R., 14 M.	2 f. tu. 2 l. car.	11·7	2,200	26,400
Cruiser . P. (2nd class) 2″–1″	Hermione .		Steel copper sheathed	4360	9000	19	0	320 0	49 6	Devonp'rt	..	Bldg.	..	..	2 6-in. Q.F., 8 4·7-in. do., 8 6-pdr., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·5	400	..

x Includes Gun Mountings, &c. *y* Propelling Machinery. (*a*) The estimated horse-power with forced draught was 4500, and the estimated speed 21·0 knots. (*b*) Reported to have made 19·5 knots with natural draught.

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GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

comp., composite hull; 2 *s.* two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun: Q F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns: f. tu. or b. tu., fixed or bow torpedo tube; l. car., launching torpedo carriage; P., deck protected; pp. partial deck protected. The thickness of the protecting decks in inches is given under the letters P. or pp.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Speed.	Coal Endurance. Coal that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Cruiser . pp. (3rd class) 1¼″	Heroine . .	*Comp.*	1420	1130	15 9	200 0	38 0	Devonp'rt	Humphrys.	1881	52,500	14,500	8 6-in. 81-cwt. B.L.R., 4 M., 1 l.	..	13·11	400	6000
1st Class or Torpedo Gun Boat	Hussar . .	Steel	1070	3500	9 0	250 0	30 6	Devonp'rt	..	Bldg.	..	..	2 4·7-in. Q.F., 4 3-pdr. do. .	5 f. tu. or l. car	19·0	100	..
Cruiser . pp. (3rd class) 1¼″	Hyacinth .	*Comp.*	1420	1190	15 9	200 0	38 0	Devonp'rt	Humphrys.	1881	52,500	14,500	8 6-in. 81-cwt. B.L.R. 4 M., 1 l.	..	13·10	400	6000
Sloop . . .	Icarus . .	*Comp.*	970	1230	13 6	167 0	32 0	Devonp'rt	Barrow .	1885	*x*39,369	*y*12,735	8 5-in. 38-cwt. B.L.R., 4 3-pdr. Q.F., 4 M., 1 l.	..	12·5	150	2300
Cruiser . . (2nd class)	Inconstant .	Iron copper sheathed	5780	7360	25 6	337 4	50 3	Pembroke	Penn .	1868	138,585	74,739	10 9-in. 12-ton M.L.R., 6 7-in. 6½-ton M.L.R., 6 20-pdr. B.L.R., 2 3-pdr. Q.F., 11 M., 2 l.	2 l. car.	16·20	750	2780
" " P. 2″–1″	Indefatigable 2 *s.*	Steel copper sheathed	3600	9000	17 6	300 0	43 8	Glasgow .	London and Glasgow	1891	Total. 181,024		2 6-in. Q.F., 6 4·7-in do., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·75	400	8000
" " P. 2″–1″	Intrepid . 2 *s.*	Steel copper sheathed	3600	9000	17 6	300 0	43 8	Glasgow .	London and Glasgow	1891	Total. 180,973		2 6-in. Q.F., 6 4·7-in. do., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·75	400	8000
" " P. 2″–1″	Iphigenia 2 *s.*	Steel copper sheathed	3600	9000	17 6	300 0	43 8	Glasgow .	London and Glasgow	1891	Total. 180,987		2 6-in. Q.F., 6 4·7-in. do., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·75	400	8000
" " .	Iris . . 2 *s.*	Steel	3730	7330	22 0	300 0	46 0	Pembroke	Maudslay .	1877	110,868	102,318	13 5-in. 2-ton B.L.R., 4 3-pdr. Q.F., 8 M., 1 l.	4 l. car.	18·0	780	4400

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1st Class or Torpedo Gun Boat	Jaseur .	2 s.	Steel	810	3500	8	9	230	0	27	0	Barrow .	Barrow .	Bldg.	Total. 49,138		2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car.	19·25	100	2500
" " .	Jason .	2 s.	Steel	810	3500	8	9	230	0	27	0	Barrow .	Barrow .	Bldg.	Total. 49,068		2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car.	19·25	100	2500
" " .	Karrakatta (Special for Australia)	2 s.	Steel	770	(a) 3500	8	3	230	0	27	0	Elswick .	Bellis .	1890	x 26,456	y 21,193	2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car.	20·0	100	2500
Cruiser . P. (3rd class) 2″–1″	Katoomba (Special for Australia) .		Steel	2575	(b) 4600	15	6	265	0	41	0	Elswick .	Hawthorn	1889	Total. 116,719		8 4·7-in. Q.F., 8 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	18·2	300	4800
Sloop . . .	Kingfisher (c) .		Comp.	1130	1090	15	9	170	0	36	0	Sheerness	Maudslay .	1879	39,300	11,850	2 90-cwt. M.L.R., 4 64-pdr. do. 6 M., 1 l.	..	11·60	150	1480
Gun Vessel . . (1st class)	Landrail .	2 s.	Steel	950	1500	10	6	195	0	28	0	Devonp'rt	Penn .	1886	37,363	12,600	1 6-in. 5-ton B.L.R., 3 5-in. 38-cwt. B.L.R., 4 3-pdr. Q.F., 3 M.	1 b. tu. 2 l. car.	14·5	250	10,000
Gun Boat . . (1st class)	Lapwing .		Comp.	805	1200	11	7½	165	0	31	0	Devonp'rt	Devonport	1889	Total. 39,952		6 4-in. 25-cwt. B.L.G., 2 3-pdr. Q.F., 2 M.	..	13·0	105	2500
Cruiser . P. (2nd class) 2″–1″	Latona .	2 s.	Steel	3400	9600	16	6	300	0	63	0	Barrow .	Barrow .	1890	Total. 171,068		2 6-in. 5-ton B.L.R., 6 4·7 in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	20·11	400	8000
" " pp. 1½″	Leander .	2 s.	Steel	4300	5500	20	6	300	0	46	0	Glasgow .	Napier .	1882	87,843	60,610	10 6-in. 5-ton. B.L.R., 4 3 pdr. Q.F., 13 M., 2 l.	4 l. car.	17·00	1000	11,000
1st Class or Torpedo Gun Boat	Leda .	2 s.	Steel	810	3500	8	9	230	0	27	0	Sheerness	Penn .	Bldg	Total. 59,539		2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car.	19·25	100	..
Gun Vessel . (2nd class)	Linnet .	2 s.	Comp.	756	1050	10	11	165	0	29	0	Blackwall	Rennie .	1880	25,281	10,382	2 7-in. 90-cwt. M.L.R., 3 20-pdr. B.L.R., 2 M.	..	11·80	180	2400
Gun Boat . . (1st class)	Lizard . .		Comp.	715	1000	11	10	165	0	29	0	Belfast .	Harland .	1886	42,770	10,000	6 4-in. 25-cwt. B.L.R., 4 M.	..	13·00	105	2500
Cruiser . P. (3rd class) 1½″	Magicienne .		Steel copper sheathed	2950	9000	17	6	265	0	42	0	Glasgow .	Hawthorn	1888	Total. 136,000		6 6-in. 5-ton B.L.R., 9 6-pdr. Q.F., 1 3-pdr. do., 3 M., 1 l.	2 f. tu. 2 l. car.	19·75	400	8000
Gun Boat . . (1st class)	Magpie . .		Comp.	805	1200	11	7½	165	0	31	0	Pembroke	Earle .	1889	x 29,400	y 9,300	6 4-in. 25-cwt. B.L.R., 4 M.	..	13·0	105	2500

x Includes Gun Mountings, &c. y Propelling Machinery. (a) The intended horse-power with forced draught was 4500, and the speed 21·0 knots.
(b) The intended horse-power with forced draught was 7500, and the speed 19·0 knots. (c) To be converted into a sailing training ship.

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GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

comp. composite hull; 2 *s.*, two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; Q.F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns; f. tu. or b. tu., fixed or bow torpedo tube; l. car., launching torpedo carriage; P., deck protected; pp., partial deck protected. The thickness of the protecting decks in inches is given under the letters P. or pp.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Speed.	Coal Endurance. Coals that can be carried in bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.		ft. in.	ft. in.	ft. in.				£ Total.	£			knots.	tons.	knots.
Cruiser . P. (3rd class) 1½″	Marathon .	Steel copper sheathed	2950	9000	17 6	265 0	42 0	Glasgow	Hawthorn	1888	136,000		6 6-in. 5-ton B.L.R., 9 6-pdr. Q.F., 1 3-pdr. do., 3 M., 1 l.	2 f. tu. 2 l. car	19·75	400	8000
Sloop . . . Gunboat	Mariner . .	*Comp.*	970	970	14 0	167 0	32 0	Devonp'rt	Hawthorn.	1884	37,156	12,841	8 5-in. 38-cwt. B.L.R., 8 M., 1 l.	..	11·50	150	2300
Cruiser . P. (3rd class) 1½″	Medea . 2 *s.*	Steel	2800	9000	16 6	265 0	41 0	Chatham	Humphrys	1888	*x*88,400	*y*53,300	6 6-in. 5-ton B.L.R., 9 6-pdr. Q.F., 1 3-pdr. do., 3 M., 1 l.	2 f. tu. 2 l. car	20·00	400	8000
" " P. 1½″	Medusa . 2 *s.*	Steel	2800	9000	16 6	265 0	41 0	Chatham	Humphrys	1888	*x*88,400	*y*53,300	6 6-in. 5-ton B.L.R., 9 6-pdr. Q.F., 1 3-pdr. do., 3 M., 1 l.	2 f. tu. 2 l. car	20·00	400	8000
Cruiser . P. (2nd class) 2″–1″	Melampus 2 *s.*	Steel	3400	9000	16 6	300 0	43 0	Barrow .	Barrow .	1890	Total. 171,635		2 6-in. B.L.R., 6 4·7 in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	20·0	400	8000
Sloop . . .	Melita . .	*Comp.*	970	1200	13 6	167 0	32 0	Malta .	Malta Dock Yard	1888	Total. 60,179		8 5-in. 40-cwt. B.L.R., 8 M., 1 l.	..	12·50	150	2100
Cruiser . P. (3rd class) 1½″	Melpomene 2 *s.*	Steel copper sheathed	2950	9000	17 6	265 0	41 0	Portsm'th	Palmer Co.	1888	*x*92,000	*y*50,000	6 6-in. 5-ton B.L.R., 9 6-pdr. Q.F., 1 3-pdr. do., 3 M., 1 l.	2 f. tu. 2 l. car	19·75	400	8000
Cruiser . . (2nd class)	Mercury . 2 *s.*	Steel	3730	7290	22 0	300 0	46 0	Pembroke	Maudslay .	1878	119,452	93,800	13 5-in. 40-cwt. B.L.R., 4 3 pdr. Q.F., 9 M., 1 l.	4 l. car.	18·00	780	4950

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Cruiser . P. (2nd class) 3″–2″	**Mersey** . 2 *s.*	Steel	4050	6000	19	6	300	0	46	0	Chatham.	Humphrys.	1885	100,000 estim'td	54,000 estim'td	2 8-in. 15 ton B.L.R., 10 6-in. 5-ton B.L.R., 3 6-pdr. Q.F., 2 3-pdr. do., 9 M., 2 l.	2 tu. sub 2 l. car.	18·00	900	8750
Cruiser . P. (3rd class) 2″–1″	**Mildura** (Special for Australia) 2 *s.*	Steel	2575	(*a*) 4600	15	6	265	0	41	0	Elswick .	Hawthorn.	1889	Total. 116,062		8 4·7-in. Q.F., 8 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l car.	18·2	300	4800
Gun Boat . . (2nd class)	**Misletoe** . .	*Comp.*	560	650	13	4	135	0	26	0	Birkenh'd	Laird .	1883	18,000	8,500	2 5-in. 38-cwt., B.L.R., 2 4-in. 22 cwt. do., 2 M., 2 l.	..	10·7	95	..
Cruiser . . (3rd class)	**Mohawk** 2 *s.*	Steel	1770	3500	14	6	225	0	36	0	Glasgow .	Thomson .	1886	*x*55,916	*y*31,667	6 6-in. 5-ton B.L.R., 8 3-pdr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	17·00	475	7000
Sloop . . .	**Mutine** . .	*Comp.*	1130	1120	15	9	170	0	36	0	Devonp'rt	Maudslay .	1880	37,500	11,770	10 5-in. 40-cwt. B.L.R., 8 M., 1 l.	..	12·10	150	1480
Cruiser . P. (2nd class) 2″–1″	**Naiad** . . 2 *s.*	Steel	3400	9000	16	6	300	0	43	0	Barrow .	Barrow .	1891	Total. 171,445		2 6-in. B.L.R., 6 4·7-in. Q.F. 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	20·0	400	8000
1st Class or Torpedo Gun Boat	**Niger** . 2 *s.*	Steel	810	3500	8	9	230	0	27	0	Barrow .	Barrow .	Bldg	Total. 48,918		2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car	19·25	100	2500
Sloop . . .	**Nymphe** . .	*Comp.*	1140	2000	12	6	195	0	28	0	Portsm'th	Greenock F'ndry Co.	1888	*x*42,400	*y*15,200	8 5-in. 40-cwt. B.L.R. 8 M. .	..	14·50	160	3000
1st Class or Torpedo Gun Boat	**Onyx** . 2 *s.*	Steel	810	3500	8	9	230	0	27	0	Birkenh'd	Laird .	Bldg	Total, 54,779		2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car.	19·25	100	..
Cruiser . P. (3rd class) 2″–1″	**Pallas** . 2 *s.*	Steel	2575	7610	15	6	265	0	41	0	Portsm'th	Hawthorn.	1890	Total. 148,828		8 4·7-in. Q.F., 8 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·1	300	4800
Gun Boat . . (1st class)	**Partridge** .	*Comp.*	755	1200	11	4	165	0	30	0	Devonp'rt	Devonport	1888	27,800	10,000	6 4-in. 25-cwt. B.L.R., 4 M.	..	13·25	105	2500
" " . .	**Peacock** . .	*Comp.*	755	1200	11	4	165	0	29	0	Pembroke	Barrow Co.	1888	27,600	10,000	6 4-in. 25 cwt. B.L.R., 4 M.	..	13·25	105	2500
Cruiser . P. (3rd class) 2′–1″	**Pearl** . 2*s.*	Steel	2575	7500	15	6	265	0	41	0	Pembroke	Earle .	1890	Total. 151,693		8 4·7-in. Q.F., 8 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·0	300	4800
Sloop . .	**Pelican** . .	*Comp.*	1130	1060	15	3	170	0	36	0	Devonp'rt	Humphrys.	1877	41,282	14,939	2 6-in. 5-ton B.L.R., 6 5-in. 38-cwt. B.L.R., 4 M., 1 l.	..	12·00	150	1480
" . .	**Penguin** . . (Surveying service)	*Comp.*	1130	1110	16	1	170	0	36	0	Glasgow .	Hawthorn.	1876	39,611	12,500	2 64-pdr. M.L.R., 2 M., 1 l.	..	11·00	150	1500

(*a*) The intended horse-power with forced draught was 7500, and the speed 19 knots.

x Includes Gun Mountings, &c.

y Propelling Machinery.

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GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

comp. composite hull; 2 *s.*, two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; Q.F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns; f. tu. or b. tu., fixed or bow torpedo tube; l. car., launching torpedo carriage; P., deck protected; pp., partial deck protected. The thickness of the protecting decks in inches is given under the letters P. or pp.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Cruiser . pp. (2nd class) 1½"	Phaeton . 2 *s.*	Steel	4300	5500	20 6	300 0	46 0	Glasgow. .	Napier .	1883	86,763	58,435	10 6-in. 5-ton B.L.R., 4 3-pdr. Q.F., 11 M., 2 l.	4 l. car.	17·00	1000	11,000
Gun Boat . . (1st class)	Pheasant .	*Comp.*	755	1200	11 4	165 0	29 0	Devonpo't	Devonport	1888	*x*27,800	*y*10,000	6 4-in. 25-cwt. B.L.R., 4 M. .	..	13·25	105	2500
Cruiser . P. (3rd class) 2"–1"	Philomel. .	Steel	2575	7500	15 6	265 0	41 0	Devonpo't	Earle .	1890	Total. 156,102		8 4·7-in. Q.F., 8 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·0	300	4800
" " P. 2"–1"	Phœbe . 2 *s.*	Steel	2575	7500	15 6	265 0	41 0	Devonpo't	Devonport	1890	Total. 161,154		8 4·7-in. Q.F., 8 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·0	300	4800
Gun Boat . . (1st class)	Pigeon . .	*Comp.*	755	1200	11 4	165 0	30 0	Pembroke	Barrow .	1888	*x*27,800	*y*10,000	6 4-in. B.L.R., 4 M. . .	..	13·25	105	2500
" " . .	Pigmy . .	*Comp.*	755	1200	11 4	165 0	30 0	Sheerness	Barrow .	1888	28,000	9,700	6 4-in. 25-cwt. B.L.R., 4 M. .	..	13·25	105	2500
Cruiser . P. (2nd class) 2"–1"	Pique . 2 *s.*	Steel copper sheathed	3600	9000	17 6	300 0	43 8	Jarrow .	Palmer .	1890	Total. 184,108		2 6-in. 5-ton B.L.R., 6 4·7-in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·75	400	8000
Gun Boat . . (1st class)	Plover . .	*Comp.*	755	1200	11 4	165 0	30 0	Pembroke	Barrow .	1888	28,000	9,700	6 4-in. 25-cwt. B.L.R., 4 M. .	..	13·25	105	2500
Torpedo Ram P. 3"–2"	Polyphemus 2 *s.*	Steel	2640	5520	20 0	240 0	40 0	Chatham.	Humphrys.	1881	114,000	60,450	6 6-pdr. Q.F., 2 M. . .	5 f. tu. subm.	17·80	300	3400
Cruiser . . (3rd class)	Porpoise 2 *s.*	Steel	1770	3500	14 6	225 0	36 0	Glasgow .	Thomson .	1886	*x*55,916	*y*31,667	6 6-in. 5-ton B.L.R., 8 3-pdr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car	17·00	475	7000

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Cruiser (3rd class)	pp. 1¼″	Pylades		Comp.	1420	1640	15	9	200	0	38	0	Sheerness	Laird	1884	45,500	16,500	14	5-in. 38-cwt. B.L.R., 8 M., 1 l.	..	13·00	400	6400
Sloop		Racer		Comp.	970	920	14	0	167	0	32	0	Devonp'rt	Hawthorn	1884	37,000	12,000	8	5-in. 38 cwt. B.L.R., 8 M., 1 l.	..	11·50	150	2300
Cruiser (3rd class)		Racoon	2 s.	Steel	1770	4500	13	6	225	0	36	0	Devonp'rt	Harland	1887	x60,606	y31,000	6	6-in. 5-ton B.L.R., 8 3-pdr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	17·00	475	7000
																Total. 184,086							
Cruiser (2nd class)	P. 2″–1″	Rainbow	2 s.	Steel copper sheathed	3600	9000	17	6	300	0	43	8	Jarrow	Palmer	1891			2	6-in. 5-ton B.L.R., 6 4·7-in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·75	400	8000
" "		Raleigh		Iron copper sheathed	5200	5640	24	7	298	0	49	0	Chatham	Humphrys	1873	147,248	46,138	8	90-cwt. M.L.R., 8–6-in. 81-cwt., B.L.R., 8 5-in. 38-cwt. do., 12 M., 4 l.	2 l. car.	15·50	550	2100
Gun Vessel (2nd class)		Rambler (Surveying service).		Comp.	835	690	13	7	157	0	29	6	Glasgow	Elder	1880	26,625	10,413	4	20-pdr. B.L.R., 1 M., 1 l.	..	10·66	40	1050
Cruiser (3rd class)	pp. 1¼″	Rapid		Comp.	1420	1400	15	9	200	0	38	0	Devonp'rt	Maudslay	1883	52,107	16,119	2	6-in. 5-ton B.L.R., 10 5-in. 38-cwt. do., 4 M., 1 l.	..	13·10	400	6000
Gun Boat (1st class)		Rattler		Comp.	715	1200	11	0	165	0	29	0	Elswick	Hawthorn	1886	x28,134	y10,600	6	4-in. 25-cwt. B.L.R., 4 M.	..	13·0	105	2500
1st Class or Torpedo Gunboat		Rattlesnake	2 s.	Steel	550	2700	8	0	200	0	23	0	Birkenh'd	Laird	1886	x21,425	y14,000	1	4-in. 25-cwt. B.L.R., 6 3-pdr. Q.F.	2 f. tu. 2 l. car.	18·5	100	3050
Gun Boat (2nd class)		Raven		Comp.	465	380	10	0	125	0	23	6	Poplar	Rennie	1882	14,800	6,250	2	64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·5	40	..
Gun Boat (1st class)		Redbreast		Comp.	805	1200	11	7½	165	0	31	0	Pembroke	Earle	1888	29,400	9,300	6	4-in. 25-cwt. B.L.R., 4 M.	..	13·0	105	2500
" "		Redpole		Comp.	805	1200	11	7½	165	0	31	0	Pembroke	Earle	188	29,400	9,300	6	4-in. 25-cwt. B.L.R., 4 M.	..	13·0	105	2500
Gun Boat (2nd class)		Redwing (Tender)		Comp.	461	440	10	0	125	0	23	6	Pembroke	Maudslay	1880	16,400	5,800	2	20-cwt. B.L.R., 2 M.	..	9·68	40	..
Sloop		Reindeer		Comp	970	1030	14	0	167	0	32	0	Devonp'rt	Hawthorn	1883	34,834	52,787	6	5-in. 36-cwt. do., 8 M., 1 l.	..	11·50	150	3200

x Includes Gun Mountings, &c. y Propelling Machinery.

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GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

comp. composite hull; 2 *s.*, two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; Q.F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns; f. tu. or b. tu., fixed or bow torpedo tube; l. car., launching torpedo carriage; P., deck protected; pp., partial deck protected. The thickness of the protecting decks in inches is given under the letters P. or pp.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.		ft. in.	ft. in.	ft. in.				£ Total.	£			knots.	tons.	knots.
1st Class or Torpedo Gunboat	**Renard** . .	Steel	810	3500	8 9	230 0	27 0	Birkenh'd	Laird .	Bldg.	54,778		2 4·7 in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car	19·25	100	..
Cruiser . P. (2nd class) 2″–1″	**Retribution** 2 *s.*	Steel copper sheathed	3600	9000	17 6	300 0	43 8	Jarrow .	Palmer .	1891	Total. 183,975		2 6-in. 5-ton B.L.R., 6 4·7-in. Q.F., 8 6-pdr. do., 1 3-pr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·75	400	8000
Cruiser . P. (3rd class) 2″–1″	**Ringarooma** 2 *s.* (Special for Australia)	Steel	2575	(*a*) 4600	15 6	265 0	41 0	Glasgow .	Thomson .	1890	Total. 128,076		8 4·7-in. Q.F., 8 3-pdr. Q.F., 4 M., 1 l.	2 f. tu. 2 l. car.	18·2	300	4800
Gun Boat . . (1st class)	**Ringdove** .	*Comp.*	805	1200	11 7½	165 0	31 5	Devonp'rt	Devonport	1889	Total. 39,753		6 4-in. 25-cwt. B.L.R., 2 3-pdr. Q.F., 2 M.	..	13·0	105	2500
Cruiser . . (2nd class)	**Rover** . .	Iron zinc sheathed	3460	4960	23 0	280 0	43 6	Blackwall	Ravenhill .	1874	104,718	65,021	14 6-in. 81-cwt. B.L.R., 8 M., 3 l.	2 l. car.	14·53	410	1840
Cruiser . P. (1st class) 5″–1″	**Royal Arthur** (was Centaur) 2 *s.*	Steel copper sheathed	7700	12000	23 9	360 0	60 0	Portsm'th	Maudslay .	1891	Total. 383,395		1 9·2-in. 22-ton B.L.R., 12 6-in. Q.F., 12 6-pdr. do., 5 3-pdr. do., 7 M., 2 l.	4 f. tu. or l. car 2 sub-merged.	19·5	850	10,000
Cruiser . pp. (3rd class) 1¼″	**Royalist** . .	*Comp.*	1420	1510	15 9	200 0	38 0	Devonp'rt	Maudslay .	1883	52,134	16·039	2 6-in. 81-cwt. B.L.R., 10 5-in. 38-cwt. do. 4 M., 1 l.	..	13·10	400	6000
" " .	**Ruby** . .	*Comp.*	2120	1830	18 8	220 0	40 0	Hull .	Earle .	1876	66,113	27,003	12 64-pdr. M.L.R., 6 M., 2 l. .	..	12·28	260	2080
Cruiser . P. (1st class) 5″–1″	**St. George** 2 *s.*	Steel copper sheathed	7700	12,000	23 9	360 0	60 8	Hull . .	Maudslay .	Bldg.	Total. 373,258		1 9·2-in. 22-ton B.L.R., 10 6-in. Q.F., 12 6-pdr. do., 5 3-pdr. do., 7 M., 2 l.	4 f. tu. or l. car 2 sub-merged.	19·5	850	10,000

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1st Class or Torpedo Gun Boat .	**Salamander** 2 *s.*	Steel	770	(*b*) 3500	8	3	230	0	27	0	Chatham .	Maudslay .	1889	Total. 57,911		2 4·7-in. Q.F., 4 3-pdr. Q.F. .	1 f. tu. 2 l. car.	20·0	100	2500
" " .	**Sandfly** 2 *s.*	Steel	525	3000	8	9	200	0	23	0	Devonp'rt	Maudslay	1887	*x* 22,877	*y* 13,290	1 4-in. 25-cwt. B.L.R., 6 3-pdr. Q.F.	2 f. tu. 2 l. car.	19·00	80	2400
Cruiser . P. (2nd class) 2″–1″	**Sappho** . .	Steel	3400	9000	16	6	300	0	43	0	Poplar .	Penn .	1891	Total. 171,853		2 6-in. Q.F., 6 4·7-in. do., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 .	2 f. tu. 2 l. car.	20·0	400	8000
Cruiser . pp. (3rd class) 1¼″	**Satellite** . .	*Comp.*	1420	1400	15	9	200	0	38	0	Sheerness	Humphrys .	1881	47,500	15,400	8 5-in. B.L.R., 4 M., 1 l.	..	13·10	400	6000
" " .	**Scout** . 2 *s.*	Steel	1580	3200	14	6	220	0	34	0	Glasgow .	Thomson .	1885	*x* 63,916	*y* 23,600	4 5-in. 40-cwt. B.L.R., 8 3-pdr. Q.F., 2 M., 1 l.	3 f. tu. 1 submerged 4 l. car.	17·00	450	6900
Cruiser . P. (2nd class) 2″–1″	**Scylla** . 2 *s.*	Steel	3400	9000	16	6	300	0	43	0	Poplar .	Penn .	1891	Total. 171,593		2 6-in. Q.F., 6 4·7-in. do., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	20·0	400	8000
1st Class or Torpedo Gun Boat .	**Seagull** . 2 *s.*	Steel	770	(*b*) 3500	8	3	230	0	27	0	Chatham .	Maudslay .	1889	Total. 56,922		2 4·7-in. 4 3-pdr. Q.F. . .	1 f. tu. 2 l. car.	20·0	100	2500
Cruiser . P. (2nd class) 3″–2″	**Severn** . 2 *s.*	Steel	4050	6000	19	6	300	0	46	0	Chatham .	Humphrys.	1885	*x* 151,681	*y* 60,940	2 8-in. 15-ton B.L.R., 10 6-in. 5-ton B.L.R., 3 6-pdr. Q.F., 2 3-pdr. do., 10 M., 2 l.	1 tu. sub 2 l. car.	18·17	900	8750
" " .	**Shah** (*c*) . .	Iron copper sheathed.	6250	7480	26	5½	334	0	52	0	Portsm'th	Ravenhill .	1873	177,912	57,333	2 9-in. 12-ton M.L.R., 16 7-in. 6½-ton do., 8 5-in. 38-cwt. B.L.R., 4 Q.F., 12 M., 4 l.	2 l. car.	16·20	890	6840
1st Class or Torpedo Gun Boat	**Sharpshooter** 2 *s.*	Steel	770	(*b*) 3500	8	3	230	0	27	0	Devonp'rt	Bellis .	1888	*x* 29,675	*y* 20,354	2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car.	20·0	100	2500
" " .	**Sheldrake** 2 *s.*	Steel	770	(*b*) 3500	8	3	230	0	27	0	Chatham .	Maudslay .	1889	Total. 57,800		2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car.	20·0	100	2500
Cruiser . P. 2nd class) 2″–1″	**Sirius** . 2 *s.*	Steel copper sheathed	3600	9000	17	6	300	0	43	8	Elswick .	Maudslay .	1890	Total. 186,649		2 6-in. B.L.R., 6 4·7-in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car	19·75	400	8000

x Includes Gun Mountings, &c. *y* Propelling Machinery.
(*b*) The intended horse-power with forced draught was 4500, and the speed 21 knots.
(*a*) The intended horse-power with forced draught was 7500, and the speed 19 knots.
(*c*) Machinery to be removed. Ship to be fitted as a receiving ship for Bermuda.

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GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

comp, composite hull; 2 *s.*, two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; Q.F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns; f. tu. or b. tu., fixed or bow torpedo tube; l. car., launching torpedo carriage; P., deck protected; pp., partial deck protected. The thickness of the protecting decks in inches is given under the letters P. or pp.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.		ft. in.	ft. in.	ft. in.				Total.				knots.	tons.	knots.
1st Class or Torpedo Gun Boat	Skipjack. 2 *s.*	Steel	770	(*b*) 3500	8 3	230 0	27 0	Chatham.	Laird .	1889	59,531		2 4·7-in. Q.F., 4 3-pdr. do.	1 f. tu. 2 l. car.	20·0	100	2500
" " .	Spanker . 2 *s.*	Steel	770	(*b*) 3500	8 3	230 0	27 0	Devonp'rt	Bellis .	1889	50,000		2 4·7-in. Q.F., 4 3-pdr. do.	1 f. tu. 2 l. car.	20·0	100	2500
Gun Boat . . (1st class)	Sparrow . :	*Comp.*	805	1200	11 7½	165 0	31 0	Greenock	Greenock	1889	39,000		6 4-in. 25-cwt. B.L.R., 2 3-pdr. Q.F., 2 M.	..	13·00	105	2500
Cruiser . P. (2nd class) 2″–1″	Spartan . 2 *s.*	Steel copper sheathed	3600	9000	17 6	300 0	43 8	Elswick .	Maudslay .	1891	186,351		2 6-in. B.L.R., 6 4·7-in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car	(*c*) 19·75	400	8000
1st Class or Torpedo Gun Boat	Speedwell 2 *s.*	Steel	770	(*b*) 3500	8 3	230 0	27 0	Devonp'rt	Laird .	1889	52,000		2 4·7-in. Q.F., 4 3-pdr. do.	1 f. tu. 2 l. car.	20·0	100	2500
" " .	Speedy . 2 *s.*	Steel	810	4500	8 9	230 0	27 0	Chiswick	Thornycrft	Bldg.	59,611		2 4·7-in. Q.F., 4 3-pdr. do.	1 f. tu. 2 l. car	20·25	100	..
" " .	Spider . 2 *s.*	Steel	525	3000	8 9	200 0	23 0	Devonp'rt	Maudslay	1887	*x*23,000	*y*13,300	1 4-in. 25-cwt. B.L.R., 6 3-pdr. Q.F.	2 f. tu. 2 l. car.	19·00	80	2400
Gun Boat . . (2nd class)	Starling . .	*Comp.*	465	360	10 0	125 0	23 6	Poplar .	Rennie .	1882	14,850	6,250	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·50	40	..
" " .	Stork (Surveying Vessel)	*Comp.*	465	350	10 0	125 0	23 6	Poplar .	Rennie .	1882	14,900	6,250	1 M., 2 l.	..	9·50	40	..

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Despatch Vessel .	Surprise	2 s.	Steel	1650	3030	14	0	250	0	32	6	Jarrow .	Palmer .	1885	x49,084	y29,680	4	5-in. 38-cwt. B.L.R., 4 6-pdr. Q.F., 2 M.	..	17·00	400	6450
Sloop . . .	Swallow .	2 s.	Comp.	1130	1570	11	6	195	0	28	0	Sheerness	Rennie .	1885	44,797	15,000	8	5-in. 38-cwt. B.L.R., 8 M. .	..	13·50	280	5000
Gun Vessel. . (2nd class)	Swift .	2 s.	Comp.	756	1010	10	11	165	0	29	0	Blackwall	Rennie .	1879	24,290	10,380	2	7-in. 90-cwt. M.L.R., 3 6-pdr. Q.F., 2 M.	..	11·81	180	2400
Cruiser . P. (2nd class) 2″–1″	Sybille .	2 s.	Steel	3400	9000	16	6	300	0	42	0	Stephen-son.	Hawthorn.	1890	Total. 174,670		2	6-in. B.L.R., 6 4·7-in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car	20·0	400	8000
Cruiser . . (3rd class)	Tartar .	2 s.	Steel	1770	3500	14	3½	225	0	36	0	Glasgow .	Thomson .	1886	x55,916	y31,667	6	6-in. 5-ton B.L.R., 8 3-pdr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	17·33	325	4850
" " P. 2″–1″	Tauranga (Special for Australia)	2 s.	Steel	2575	(a) 7200	15	6	265	0	41	0	Glasgow .	Thomson .	1889	Total. 128,101		8	4·7-in. Q.F., 8 3-pdr. Q.F., 4 M., 1 l.	2 f. tu. 2 l. car.	19·0	300	4800
Cruiser . P. (2nd class) 2″–1″	Terpsichore	2 s.	Steel	3400	9000	16	6	300	0	43	0	Glasgow .	Thomson .	1890	Total. 173,341		2	6-in. B.L.R., 6 4·7-in. Q.F., 8 6-pdr. do., 1 3-pdr. do.	2 f. tu. 2 l. car	20·5	400	8000
" " P. 3″–2″	Thames .	2 s.	Steel	4050	5700	19	6	300	0	46	0	Pembroke	Penn .	1885	151,952	53,500	2	8-in. 15-ton B.L.R., 10 6-in. 5-ton B.L.R., 3 6-pdr. Q.F., 2 3-pdr. do., 10 M., 2 l.	2 l. car.	18·00	900	8750
Cruiser . P. (1st class) 5″–1″	Theseus .	2 s.	Steel	7350	12,000	23	9	360	0	60	0	Blackwall	Maudslay .	Bldg.	Total. 344,324		2	9·2-in. 22-ton. B.L.R., 10·6-in. Q.F., 12 6-pdr., and 5 3-pdr. do., 7 M., 2 l.	4 f. tu. or l. car 2 sub-merged.	19·75	850	10,000
Cruiser . P. (2nd class) 2″–1″	Thetis .	2 s.	Steel	3400	9000	16	6	300	0	43	0	Glasgow .	Thomson .	1890	Total. 173,146		2	6-in. B.L.R., 6 4·7-in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	20·0	400	8000
Gun Boat . . (1st class)	Thrush . .	Comp.		805	1200	11	7½	165	0	31	0	Greenock	Greenock F'ndry Co.	1889	Total. 39,000		6	4-in. 25-cwt. B.L.R., 2 3-pdr. Q.F., 2 M.	..	13·00	105	2500
Cruiser . . (3rd class)	Tourmaline .	Comp.		2120	2000	18	8	220	0	40	0	Middl'sbro	Hawthorn.	1875	69,998	25,771	4	6-in. 5-ton B.L.R., 2 6-in. 89-cwt. do., 8 5-in. 38-cwt. do., 8 M., 2 l.	..	12·62	280	2000
Cruiser . P. (2nd class) 2″–1″	Tribune .	2 s.	Steel	3400	9000	16	6	300	0	43	0	Glasgow .	Thomson .	1891	Total. 173,006		2	6-in. B.L.R., 6 4·7-in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	20·0	400	8000

x Includes Gun Mountings, &c. y Propelling Machinery.

(a) The intended horse-power with forced draught was 7500, and the speed 19 knots. (b) The intended horse-power with forced draught was 4500, and the speed 21 knots.

(c) Reported to have made 20·44 knots on her trials.

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GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

comp., composite hull; 2 *s.*, two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun: Q.F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns; f. tu. or b. tu., fixed or bow torpedo tube; l. car., launching torpedo carriage; P., deck protected; pp., partial deck protected. The thickness of the protecting decks in inches is given under the letters P. or pp.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Speed.	Coal Endurance. Coal that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			Tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Torpedo Vessel .	Vesuvius 2 *s.*	Iron	245	390	8 6	90 0	22 0	Pembroke	Maudslay .	1874	10,522	7,465	Nil	4 tu.	9·71	25	..
Cruiser . . (2nd class)	Volage . .	Iron copper sheathed	3080	4530	22 0	270 0	42 0	Blackwall	Ravenhill .	1874	91,817	41,000	10 6-in. 81-cwt. B.L.R., 2 64-pdr. M.L.R., 10 M., 2 l.	2 l. car.	15·30	420	1850
Torpedo Ship . Depôt . P. 5″–2½″	Vulcan . 2 *s.*	Steel	6620	(*a*) 8166	23 0	350 0	58 0	Portsm'th	Humphrys	1889	Total. 370,447		8 4·7-in. Q.F., 12 3-in. Q.F. .	2 f. tu. 4 l. car.	18·537	1000	12,000
Cruiser . P. (3rd class) 2″–1″	Wallaroo 2 *s.* (Special for Australia)	Steel	2575	(*b*) 4600	15 6	265 0	41 0	Elswick	Hawthorn.	1889	Total. 115,995		8 4·7-in. Q.F., 12 3-pdr. do., 15 M., 1 l.	2 f. tu. 2 l. car.	18·2	300	4800
Sloop . . .	Wanderer .	*Comp.*	925	750	14 0	157 0	32 0	Middl'sbro	Hawthorn.	1883	25,850	9,800	2 6-in. 81-cwt. B.L.R., 2 5-in. 36-cwt. do., 2 M., 1 l.	..	11·30	135	1700
Gunboat . . (2nd class)	Watchful .	*Comp.*	560	650	11 6	135 0	26 0	Birkenh'd	Lairds .	1883	Total. 32,527		2 5-in. 40-cwt. B.L.R., 2 4-in. 22-cwt. do., 2 M.	..	11·0	85	..
Gunboat . . (1st class)	Widgeon 2 *s.*	*Comp.*	805	1200	11 7½	165 0	30 0	Pembroke	Rennie .	1889	Total. 39,315		6 4-in. 25-cwt. B.L.R., 2 3-pdr. Q.F., 2 M.	..	13·00	105	2500
Sloop . . .	Wild Swan .	*Comp.*	1130	1090	15 10	170 0	36 0	Glasgow .	Hawthorn.	1876	39,643	11,853	2 6-in. 5-ton B.L.R., 6 5-in. 38-cwt. do., 4 M., 1 l.	..	11·35	150	1120
Gunboat . . (2nd class)	Wrangler .	*Comp.*	465	480	10 6	125 0	23 6	Barrow .	Barrow .	1880	17,267	5,460	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·88	40	..

(*a*) Was intended to have 12,000 horse-power with forced draught, and a speed of 20 knots.

(*b*) Was intended to have 7500 horse-power with forced draught, and a speed of 19 knots.

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Royal Naval Reserved Merchant Cruisers.

LIST OF VESSELS held by the Owners at the disposition of the Lords Commissioners of the Admiralty.

	Name.	Owners.	Length.	Breadth.	Maximum Draught of Water for the Admiralty List.	Gross Tonnage.	Indicated Horse-Power.	Average Ocean Speed.
			Feet.	Feet.	Feet.	Tons.		Knots.
With Subvention.	Etruria	Cunard Company	501·5	57·2	26	7,718	14,500	19
	Umbria	" "	501·5	57·2	26	7,718	14,500	19
	Aurania	" "	470	57·2	26	7,269	9,500	17
	Victoria	Peninsular and Oriental Co.	466	52	22½	6,300	7,000	17½
	Britannia	" " "	466	52	22½	6,300	7,000	17½
	Oceana	" " "	466	52	22½	6,300	7,000	17½
	City of Paris	2 *s.* Inman and International Co.	525	63¼	24½	10,500	18,000	19
	City of New York	2 *s.* " " "	525	63¼	24½	10,500	18,000	19
	Majestic	2 *s.* White Star Company	565	58	24½	10,000	17,000	19
	Teutonic	2 *s.* " "	565	58	24½	10,000	17,000	19
	Empress of India	2 *s.* Canadian Pacific Railway Co.	440	51	24½	5,905	10,000	16½
	Empress of China	2 *s.* " " "	440	51	24½	5,905	10,000	16½
	Empress of Japan	2 *s.* " " "	440	51	24½	5,905	10,000	16½
	Britannic	White Star Company	455	45·2	25	5,004	10,000	16
	Germanic	" "	455	45·2	25	5,008	5,300	16
	Adriatic	" "	437·2	40·9	23	3,888	5,200	15
	Celtic	" "	437·2	40·9	23	3,867	5,200	15
	Servia	Cunard Company	515	52·1	26	7,392	3,600	16½
	Gallia	" "	430·1	44·6	24	4,809	3,600	15½
	Arcadia	Peninsular and Oriental Co.	466	52	22½	6,300	7,000	17½
	Valetta	" " "	420·4	45·1	22½	4,911	5,000	16
	Massilia	" " "	420·4	45·1	22½	4,908	5,000	16
	Rome	" " "	430·1	44·4	22½	4,885	5,000	15
	Carthage	" " "	430·1	44·4	22½	5,013	5,000	15
	Ballarat	" " "	420·2	43	22½	4,752	4,500	15
	Parramatta	" " "	420·2	43	22½	4,759	4,500	14½
	City of Berlin	Inman and International Co.	..	..	..	5,491	6,000	15½
	City of Chicago	" " "	..	..	..	5,202	4,500	14

There are numerous ships on the Admiralty List complying with Admiralty conditions as to subdivision which have no national tie. They are suitable for receiving an armament, but there is no arrangement with Owners, except the promise of preference for occasional State employment.

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Smaller Vessels, Gunboats.

Smaller Vessels, &c.

Note.—Troop and store ships, yachts, armed tugs, special service and harbour-service vessels, training ships, coast guard vessels, and small surveying vessels are not included.

Paddle-wheel Vessels. — Alecto, Cockatrice, Enchantress (late Helicon), Pioneer, Research (surveying vessel), Sphinx, Vigilant.

Twin Screw Gunboats (Iron).—Dee, Don, Esk, Medina, Medway, Sabrina, Slaney, Spey, Tay, Tees, Trent, Tweed, 363 tons; 320 to 410 I.HP.

Twin Screw Iron or Steel Gunboats (*Staunch Type*).—Ant, Arrow, Badger, Blazer, Bloodhound, Bonetta, Bouncer, Bulldog, Bustard, Comet, Cuckoo, Fidget, Gadfly, Griper, Hyæna, Insolent, Kite, Mastiff, Pickle, Pike, Pincher, Plucky, Scourge, Snake, Snap, Staunch, Tickler, Weasel, 180 to 254 tons; 130 to 270 I.HP.

Torpedo Boats.

First Class.

19 of about 85 feet in length, 28 tons displacement, and 350 to 500 I.HP., of about 18 to 20 knots speed. Nos. 1–15 and 17–20.

2 of about 100 feet in length, 40 tons displacement, and 350 to 500 I.HP. (at Esquimalt). Nos. 39 and 40.

4 of about 110 to 113 feet in length, 63 to 67 tons displacement, and about 18½ to 20 knots speed. Nos. 21–24.

48 of about 125 feet in length, 60 to 66 tons displacement, and 750 I.HP., and about 21 knots speed. Nos. 25–33 and 41–79.

5 of about 125 feet in length, 85 tons displacement, and 750 I.HP. Nos. 34–38.

1 of about 135 feet in length (Falke type), 87 tons displacement, and 1320 I.HP. No. 80.

1 of about 150 feet in length (late Swift), 137 tons displacement, and about 1300 I.HP. No. 81.

6 of about 130 feet in length, with a speed of 22½ knots. Nos. 82–87.

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These carry an armament of 3-pdr. quick-firing and machine guns, and three torpedo-launching tubes.

Ten more first-class torpedo-boats of the most approved type are to be built by contract, and provision for them is made in the Navy Estimates for 1892–93.

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Second Class.

51 of 60 to 66 feet in length, 12 tons displacement, and of 100 to 140 I.HP.
10 about the same length and of improved type, with a speed of 16 knots.
—
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TORPEDO BOATS (WOOD).

12 of 56 feet in length, 11 tons displacement, and 150 I.HP.

The following vessels of various classes are noted in the official *Navy List* for January, 1892, as being non-effective for sea service, and mainly for sale :—

Name.	Displacement.	Indicated Horse-power.	When Built.	Speed in knots.
Algerine (Screw Gun-vessel)	835	810 (to be sold)	1880	10·5
Bellerophon	3307	Sailing (to be sold)	..	..
Columbine	475	" " "	..	..
Dragon (Screw Sloop)	1130	1010 (to be sold)	1877	11·52
Foudroyant	3502	Sailing (to be sold)	..	..
Griffon	780	790 (to be sold)	1876	10·87
Harpy (Paddle)	500	520 " "	1845	..
Irresistible	..	Sailing (to be sold)	1859	..
Miranda (Screw Sloop)	1130	1020 (to be sold)	1879	11·5
Opal (Screw Corvette)	2120	2190 " "	1875	13·4
Pegasus (Screw Sloop)	1130	970 " "	1878	11·47
Ranger (Screw Gun-vessel)	835	760 " "	1880	10·95
Ready (Gun-vessel)	610	890 " "	1872	11
Sapphire (Screw Corvette)	1970	2360 " "	1874	13·58
Swinger (Screw Gunboat)	430	520 " "	1872	10·38
Turquoise (Screw Corvette)	2120	1990 " "	1876	12·32
Victoria (3 decker)	6959	4191 ..	1859	..
Volcano (Paddle Frigate)	1006	205 (to be sold)	1836	..

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Indian Marine.

(The ironclad ships Abyssinia and Magdala, belonging to the Indian Government, are included in the alphabetical list of Armoured Ships of the Royal Navy.)

Class of Ship.	Name.	Material of Construction.	Propellers.	Where Built.	When Launched	Length.	Breadth.	Draught of Water.	Displacement.	Indicated Horse-Power.	Speed.	Coal Storage.	Armament.
						ft. in.	ft. in.	ft. in.				tons.	
Troop Ship	Amberwitch	Iron	1	Liverpool	1862	175 6	27 0	12 0	1,010	250	7·7	90	
1st class or Torpedo Gunboat	Assaye	Steel	2	Elswick	1891	230 0	27 0	8 3	735	4,500	21·0	100	2 4·7-in. Q.F., 4 3-pr. do.
Stern Wheeler	Bhamo	Composite	..	..	..	..	..	..	255	512	..	..	Two Machine guns.
Troop Ship	Canning, was Golconda	Steel	1	Glasgow	1882	285 0	36 2	16 8	3,300	1,080	10·6	400	
Troop Ship	Clive	Iron and Steel	1	Birkenhead	1882	300 0	45 6	16 6	3,570	2,300	12·0	500	
Inland Steamer	Comet	Steel	Pad.	..	..	..	..	..	144	190	..	..	Two 5-barrel Nordenfelts.
Sailing Ship	Czarewitch	Composite	..	Sunderland	1866	185 0	32 0	19 6	1,990				
Troop Ship	Dalhousie	Steel	1	Greenock	1891	239 6	36 0	15 7	1,960	1,500	13·0	300	Six 6-pr. Q.F. and 4 M.
Surveying Ship	Investigator	Wood	Pad.	Bombay	1881	180 0	25 8	11 3	856	660	10·5	105	
Inland Steamer	Irrawaddy	Iron	Pad.	..	..	..	..	..	614	750	..	..	Four Machine guns, Nordenfelts.
Despatch Vessel	Lawrence	Steel	Pad.	Birkenhead	1886	212 2	32 2	18 3	1,154	1,277	13·5	270	Four 4-inch B.L.R.; 4 6-pr. Q.F., 4 M.
Stern Wheeler	Pagan	Composite	..	..	..	..	..	..	255	512	..	..	Two Machine guns.
1st class or Torpedo Gunboat	Plassy	Steel	2	Elswick	1890	230 0	27 0	8 3	735	4,500	21·0	100	2 4·7-in. Q.F., 4 3-pr. do.
Guard Ship	Quangtung	Iron	Pad.	Birkenhead	1863	185 3	24 7	11 3	900	520	..	160	Six 9-prs. R.M.L.
Inland Steamer	Sir Wm. Peel	Iron	Pad.	..	..	..	..	..	302	600	..	..	Two 12-pr. Howitzers; four Nordenfelt M.G.
Inland Steamer	Sladen	Steel	Pad.	..	..	..	..	..	260	360	..	..	Three Nordenfelt M.G.
Troop Ship	Tenasserim	Iron	1	London	1872	250 0	35 0	18 1	2,570	1,140	11·0	385	

India also possesses seven First-class Torpedo-boats of the newest type. They were built in England, and sent out in 1889.

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Colonial Marine (Great Britain).

(The Ironclad Turret-ship Cerberus, belonging to the Victorian Government, the five special second class Cruisers, and the two Torpedo Gunboats of the Sharpshooter class for Australia are included in the alphabetical list of Ships of the Royal Navy.)

To what Government belonging.	Class of Ship.	Name.	Material of Construction.	Propellers.	Where Built.	When Launched.	Length.	Breadth.	Draught of Water.	Displacement.	Indicated Horse-Power.	Speed.	Coal Storage.	Armament.
							ft. in.	ft. in.	ft. in.				tons.	
VICTORIA	Old line-of-battle ship	Nelson	Wood	1	Portsmouth	Converted 1860	216 3	54 6	..	4096	2102	10·0	..	Two 7-in. M.L.R.; 20 64-prs. M.L.R.; 2 M.
	Gunboat	Albert	Steel	2	..	1883	115 0	25 0	10 0	350	400	10·0	..	One 8-in. 12-ton B.L.R.; 1 6-in. 4-ton do.; 2 9-prs. do.; 2 1-in. Nordenfelts; 2 4·7-in. Q.F.
	Gunboat	Victoria	Steel	2	..	1883	140 0	27 0	11 0	530	800	12·0	..	One 8-in. 12-ton B.L.R.; 1 6-in. do.; 2 12½-pr. do.; 2 1-in. Nordenfelts.
	Gunboat	Batman	Iron	..	..	..	..	..	..	387	350	..	..	One 6-in. 4-ton B.L.R.; two Nordenfelts.
	Gunboat	Fawkner	Iron	..	..	..	..	..	..	387	350	..	..	One 6-in. 4-ton B.L.R.; 1 6-pr. Q.F.; 2 Gatlings.
	Gunboat	Gannet	Iron	..	..	..	..	..	..	346	500	..	..	One 6-in. 4-ton B.L.R.; two Nordenfelts.
	Gunboat	Lady Loch	..	..	..	..	..	..	..	336	..	12·0	..	One 6-in. 4-ton B.L.R. one 6-pr. Q.F.
	First class torpedo boat	Childers	Steel	1	Chiswick	1883	113 0	12 6	5 6	63	750	20·0	10	Two 1½-in. Hotchkiss guns.
QUEENSLAND	Gun-vessel	Gayundah	Steel	2	Glasgow	1884	115 0	25 0	10 0	450	400	10·0	..	One 8-in. 11½-ton B.L.R.; one 6-in. 4-ton do.; one 3-pr. Q.F.G.; two Nordenfelts.
	Gun-vessel	Paluma	Steel	2	Glasgow	1884	115 0	25 0	10 0	450	400	10·0	..	One 8-in. 11½-ton B.L.R.; one 6-in. 4-ton do.; one 3-pr. Q.F.G.; two Nordenfelts.
	Gunboat	Otter	Steel	2	..	..	..	..	..	290	460	..	..	One 64-pr. M.L.R.
	Gunboat	Bonito	Iron	2	..	..	..	..	..	450	400			
	Gunboat	Stingaree	Iron	2	..	..	..	..	..	450	400			
SOUTH AUSTRALIA	Cruiser	Protector	Steel	2	..	1884	188 0	30 0	12 6	920	1640	14·0	..	One 8-in. 11½-ton B.L.R.; five 6-in. 4-ton do.; five Gatlings.

Note.—The Victorian Government also possesses two Second-class Steel Torpedo-boats and three Torpedo Launches; the Queensland Government also possesses one Second-class Steel Torpedo-boat; the New South Wales Government possesses the Training-ship Wolverine and two First-class Torpedo-boats. The Tasmanian Government one Second-class Torpedo-boat. New Zealand has four Second-class Torpedo-boats.

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II.

FOREIGN ARMOURED AND UNARMOURED SHIPS.

THE principal dimensions and other details of the ships in the following lists have been in many cases extracted from the Austrian *Marine-Almanach*. With few exceptions all details concerning the ships of any nation have been printed either in the English naval periodicals or in the English newspapers, or in those of foreign countries. Where the latter sources of information failed, the deficiency has been made up from the *Navy Estimates* submitted to the several national Parliaments, and from other public official documents. It would have been impossible in every case to note the source from which each detail was derived without overburdening the pages with references and adding enormously to the size of the book.

The alphabetical arrangement of the ships in each of the two great divisions, armoured and unarmoured, has been followed so as to facilitate reference. There being now no uniform system of classifying the ships of all nations, an attempt has been made to assimilate as far as possible the classification of foreign fleets to that adopted in the British *Navy List*. Occasionally this has been only approximately practicable. It will be observed that the distinction between the smaller gun-*vessels* and the sea-going gun-*boats* is not always apparent, and the former term, applied by some nations to craft to which we apply the latter, has, for special reasons, been preserved.

The vessels commonly known as Torpedo Catchers are named in these lists First Class or Torpedo Gunboats. In the British Official Navy Lists they are called First Class Gunboats.

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The sketches of the ships are all drawn on the same scale (except in a few cases specially named), so that their relative sizes are apparent by inspection.

The designation of foreign guns as a general rule by *centimetres* of calibre will permit easy reference to the Tables of Ordnance of the several Powers in Part III. of this volume. In general, it may be stated that, as every nation is engaged in either replacing its naval ordnance with new and improved pieces, or in rearranging the armament of individual ships, it has been only possible to republish the latest accessible information on the subject. The machine gun and torpedo armaments of every fleet vary continually.

ABBREVIATIONS.

A list of Abbreviations of the several classes of ships and vessels is placed at the head of each Table. The following refer to armaments throughout:—

B.L.R.	Breech-loading rifled gun.
M.L.R.	Muzzle „ „ „
l.	Light gun.
M.	Machine gun.
Q.F.	Quick-firing gun.
f. tu. / l. car	Fixed torpedo tube or launching carriage for Whitehead Torpedoes.
P.	Deck protected throughout.
pp.	Deck protected amidships.

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ARGENTINE REPUBLIC.—Armoured Ships.

c.b., central-battery ship; *c.s.t.*, coast-service turret ship.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Battery.	Backing. Deck Plating.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. At ten knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
c.b.	Almirante Brown (steel)	4200	240 0	50 0	9 (comp.)	8 (comp.)	11 & 8 1½"	20 6	2	4500	8 8-in. 11½-ton B.L.R., 6 4½-in. do. (Armstrong) 4 M.	2 f. tu. or l. car	1880	..	13·75	650	4300
c.s.t.	Andes	1535	186 0	44 0	6	8 (turret)	11⅞ 1"	9 6	2	750	2 11-in. 26-ton B.L.R., 2 4½-in. do., 2 l., 4 M.	..	1875	..	9·05	120	2880
c.d.v.	Independencia . .	2500	230 0	43 0	8 (comp.)	8 (barbette) (comp.)	..	13 0	2	3000	2 24-c.m. B.L.R. (Krupp), 4 12-c.m. Q.F., 4 3-pdr. do., 4 1-pdr. do.	2 f. tu. or l. car	1891	..	14·00	300	4500
c.d.v.	Nueve de Julio . .	2500	230 0	43 0	8 (comp.)	8 (barbette) (comp.)	..	13 0	2	3000	2 24-c.m. B.L.R. (Krupp), 4 12-c.m. Q.F., 4 3-pdr. do., 4 1-pdr. do.	2 f. tu. or l. car	1890	..	14·00	300	4500
c.s.t.	Plata	1535	186 0	44 0	6	8 "	11⅞ 1"	9 6	2	750	2 11-in. 26-ton B.L.R., 2 4½-in. do., 2 l., 4 M.	..	1874	..	9·05	120	2880

The two small ironclads for river service—Independencia and Nueve de Julio, above named—are now being completed by Messrs. Laird at Birkenhead.

ARGENTINE REPUBLIC.—Unarmoured Ships.

cr., cruiser; *g.v.*, gun-vessel; *tor.g.b.*, torpedo gunboat; P., continuous protective deck with thickness of plates under.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. At ten knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
g.v.	Argentina .	820	192 0	27 0	Steel	13 0	1	850	1 6-in. B.L.R., 6 7-cm. Krupp do., 4 M. .	..	1883	..	12·0	220	..
tor.g.b.	Espora . .	520	210 0	25 0	Steel	8 0	2	3250	3 14-pdr. 3-in. Q.F., 4 3-pdr. do., 2 M. .	5 l. car.	1890	..	20·0	100	2,500
cr.	Patagonia .	1530	220 0	32 10	Steel & wood	12 9	2	2400	1 10-in. B.L.R., 3 6-in. do., 6 l., 10 M. .	..	1885 at Trieste.	..	14·0	350	..
g.v.	Parana . .	550	142 8	25 0	Iron	11 9	1	475	2 6-in. B.L.R., 2 4½-in. do. . . .	..	1874	..	11·0	..	..
tor.g.b.	Rosales . .	520	210 0	25 0	Steel	8 0	2	3250	3 14-pdr. Q.F., 4 3-pdr. do., 2 M. .	5 l. car.	1890	..	20·0	100	2,500
cr.	25 de Mayo P. 4½"–2"	3200	325 0	43 0	Steel 4½"–2"	16 0	2	13,800	2 21-cm. B.L.R., 8 12-cm. Q.F., 12 3-pdr. do., and 12 1-pdr. do.	3 l. car.	1890	..	22·43	600	10,000
g.v.	Uruguay .	550	142 8	25 0	Iron	11 9	1	475	2 6-in. B.L.R., 2 4½-in. do. . . .	..	1874	..	11·0	..	..

4 *Gunboats* (*Rendel type*), Bermejo, Constitucion, Pilcomayo, Republica, 416 tons, 420 I.HP.; 2 *1st class Torpedo boats of the Coureur type* improved by Thornycroft; 6 *1st class Torpedo boats of the latest Yarrow type*; 4 *1st class Torpedo boats* (100 ft. long, of 600 I.HP. and 20 knots speed); 8 *2nd class Torpedo boats of the most recent Yarrow type*; 4 *Spar Torpedo boats*; 1 *paddle Torpedo School vessel*, Maipu; 7 *screw steam vessels*; 6 *paddle-wheel vessels*, besides steam transports, and a sailing Corvette of 650 tons.

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AUSTRIA.—Armoured Ships.

b., barbette ship; *br.*, broadside ship; *c.b.*, central-battery ship; *c.s.*, coast service ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Battery or Turret.	Backing. Deck Plating.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Date of Launch.	Cost.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. At 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
c.b.	**Archduke Albert** (iron)	5940	285 2	56 3	9	7	9½ 1½"	22 0	1	3600	8 24-c.m. B.L.R. 15½-ton Krupp, 6 9 c.m. Uchatius, 11 M., 2 l.	..	1872	357,600	13·00	453	1472
b.	**Archduke Ferdinand Max** (Gunnery ship) (wood)	5060	262 0	52 6	5	5	..	23 6	1	3500	14 18-c.m. Krupp, B.L., 4 9-c.m. Uchatius, 5 M., 2 l.	..	1865	..	12·50	330	..
b.	**Crown Prince Rudolph** (steel)	6870	295 0	62 4	12	11	.. 2¾"	25 3	2	7500	3 30½-c.m. 48-ton B.L.R. Kr., 6 12 c.m. do., 11 M., 2 l.	..	1887	330,000	16·00	600	..
c.b.	**Custoza** . (iron)	7060	302 3	58 0	9	7	8¼ 1½"	24 6	1	4820	8 26-c.m. 22-ton Krupp, 6 9 c.m. Uchatius, 11 M., 2 l.	..	1872	414,400	14·00	584	1624
c.b.	**Don Juan de Austria** (iron)	3550	240 3	50 0	8	6	9¾ 1"	20 0	1	2920	8 21-c.m. 10-ton Krupp, 6 9 c.m. Uchatius, 11 M., 2 l.	..	1875	..	13·0	380	2000
br.	**Habsburg** (wood)	5140	262 0	52 0	5	5	27⅞	23 9	1	3500	14 7-in. 6½-ton M.L.R. Armstrong, 4 9-c.m. Uchatius, 9 M., 2 l.	..	1865	280,672	12·00	330	..
c.b.	**Kaiser** . (wood)	5810	254 0	58 3	6	5½	31	24 3	1	3200	10 9-in. 12-ton Armstrong M.L.R., 6 9-c.m. Uch., 11 M., 2 l.	..	1871	337,200	13·00	450	1519
c.b.	**Kaiser Max** (iron)	3550	240 3	50 0	8	6	9¾ 1"	20 0	1	2890	8 21-c.m. 10-ton Krupp, 4 9 c.m. Uchatius, 11 M., 2 l.	..	1875	211,600	13·00	380	2000
c.b.	**Lissa** . (wood)	6080	288 3	56 9	6	5½	30	26 0	1	4200	12 24-c.m. 15½-ton Krupp, 4 9 c.m. Uchatius, 11 M., 2 l.	..	1869	412,800	13·00	490	1420
c.b.	**Prince Eugen** (iron)	3550	240 6	50 0	8	6	9¾ 1"	20 0	1	2960	8 21-c.m. 10-ton Krupp, 4 9 c.m. Uchatius, 11 M., 2 l.	..	1877	..	13·00	380	2000
b.	**Princess Imperial Stefanie** (was Archduke Ferdinand Max) (steel)	5060	278 10	55 9	9	8	.. 1"	21 6	2	8300	2 30½-c.m. 48-ton Krupp, 6 15 c.m. 5-ton Krupp, 11 M., 2 l.	..	1887	300,000	17·00	400	..
c.b.	**Tegetthoff** (iron & steel)	7390	286 11	71 1	14	14	9¾ 3"	24 10	1	5000	6 28-c.m. 27-ton Krupp, 6 9 c.m. Uchatius, 11 M., 2 l.	..	1878	?247,378	14·00	670	3300
River Monitor	**Körös** . (steel)	448	..	..	..	..	1"	..	2	1250	5 Q.F.	..	Bldg.	..	..	..	..
" "	**Leitha** (iron & steel)	310	166 0	27 6	1¾	2½ (turret)	7½ 1"	3 7	2	320	2 15-c.m. Wahrendorf, 1 M.	..	1871	20,000	8·00	20	..
" "	**Maros** (iron & steel)	310	166 0	27 6	1¾	2½ (turret)	7½ 1"	3 7	2	320	2 15-c.m. Wahrendorf, 1 M.	..	1871	20,000	8·00	20	..
" "	**Samos** . (steel)	448	..	..	..	..	1"	..	2	1250	5 Q.F.	..	Bldg.	..	..	..	..

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AUSTRIA.—Unarmoured Ships.

corv., corvette; *fr. cr.*, frigate-built cruiser; *g. v.*, gun-vessel; *to. g. b.*, torpedo gunboat; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes; P., continuous protective deck with thickness of plating under.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
g. v.	**Albatross**	570	150 11	26 3	wood	11 2	1	580	2 15-c.m. 3-ton Wahrendorf, 1 l.	..	1873	..	10·00	60	..
fr. cr.	**Archduke Frederic**	1570	173 10	39 5	wood	16 9	1	780	14 15-c.m. 3-ton Wahrendorf, 1 l.	..	1874	..	9·00	200	..
corv.	**Aurora**	1340	190 6	32 10	composite	16 1	1	1170	2 15-c.m. 3-ton Wahrendorf, 5 l., 2 M.	..	1873	..	11·00	160	..
to. g. b.	**Blitz**	360	193 6	22 4	steel	8 0	..	2600	8 Q.F.	..	1888	..	21·0	..	..
fr. cr.	**Donau**	2343	233 4	42 8	wood	19 8	1	1430	11 15-c.m. 5-ton Krupp, 1 l.	..	1874	..	12·00	320	..
Torpedo depôt-ship	**Elizabeth**	1570	197 0	32 10	iron	14 0	..	1000	4 M., 4 l.	..	1854	..	11·00	..	..
corv.	**Fasana**	1970	223 3	39 5	wood	16 9	1	1750	4 15-c.m. 5-ton Krupp, 3 l.	..	1870	..	12·00	315	..
cr.	**Frundsberg**	1340	190 6	32 10	composite	16 1	1	1260	2 15-c.m. 3-ton Wahrendorf, 5 l., 2 M.	..	1873	..	11·00	160	..
corv.	**Heligoland** (Harbour Service)	1820	226 6	36 2	wood	16 9	1	1860	5 15-c.m. 7-ton Krupp, 1 l.	..	1867	..	12·00	250	..
g. v.	**Hum**	900	173 10	29 6	wood	12 6	1	920	4 15-c.m. 3-ton Wahrendorf 1 l.	..	1861	..	13·00	150	..
cr. P. 2¼"	**Kaiserin Elizabeth**	4000	321 6	47 6	steel	18 7	2	9000	2 24-c.m. 27-ton B.L.R. Krupp, 6 15-c.m. 6-ton do., 11 Q.F., 2 l.	5 f. tu. or l.car	1890	..	19·0	660	4500
" P. 2¼"	**Kaiser Franz Joseph**	4000	321 6	47 6	steel	18 7	2	9000	2 24-c.m. 27-ton B.L.R. Krupp, 6 15-cm. 6-ton do., 11 Q.F., 2 l.	5 f. tu. or l.car	1889	..	19·0	660	4500
g. v.	**Kerka**	540	146 8	26 3	wood	11 2	1	300	2 15-c.m. 3-ton Wahrendorf, 1 l.	..	1860	..	9·00	50	..
to. g. b.	**Komet**	360	193 6	22 4	steel	8 0	..	2600	8 Q.F.	..	1888	..	21·0	..	..
fr. cr.	**Laudon**	3430	253 0	46 0	iron & wood	20 8	1	2850	15 15-c.m. 5-ton Krupp, 7 M., 2 l.	..	1873	..	13·00	450	..

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Torpedo cruiser	**Leopard**	1530	224	0	34	0	steel	14	0	2	3500	2 12-c.m. 2¼-ton Krupp, 10 Q.F. & M.	4 tu. or l.car	1886	200,000	18·30	250	..
Torpedo vessel	**Lussin**	913	200	4	26	3	steel	12	2	2	2600	2 15-c.m. 5-ton Krupp, 7 M., 1 l.	..	1883	..	14·00	200	..
cr. P. 2¼″	**Maria Teresa**	5000	..		..		steel	..		2	9800	2 24-cm. 27-ton B.L.R. Krupp, 6 15-cm. 6-ton do., 11 Q.F., 2 l.	5 f. tu. or l.car	Bldg.	..	19·0	660	4500
to. g. b.	**Meteor**	350	187	0	22	4	steel	8	0	2	2600	2 12-c.m. 2¼-ton B.L.R. Krupp, 10 Q.F. & M.	f. tu. or l.car	1887	..	21·0	120	..
g. v.	**Narenta**	540	147	8	26	3	wood	11	2	1	310	2 15-c.m. 3-ton Wahrendorf, 1 l.	..	1860	..	9·00	50	..
,,	**Nautilus**	570	150	11	26	3	wood	11	2	1	410	2 15-c.m. 3-ton Wahrendorf, 1 l.	..	1873	..	9·00	60	..
Torpedo cruiser	**Panther**	1530	224	0	34	0	steel	14	0	2	3500	2 12-c.m. (35 cal.) 2¼-ton Krupp, 10 Q.F. & M.	4 f. tu. or l.car	1885	..	18·50	250	..
Torpedo depôt-ship	**Pelican**	2440	279	0	39	4	steel	15	6	..	4600	2 6-in. B.L.R., 8 Q.F.	..	1891	..	16·0	..	..
to. g. b.	**Planet**	480	210	0	23	0	steel	8	3	2	3500	10 Q.F.	1 l. car.	1889	..	20·0	..	..
fr. cr.	**Radetzky**	3430	253	0	46	0	composite	20	8	1	3400	15 15-c.m. 5-ton Krupp, 7 M., 2 l.	..	1872	..	14·00	450	..
,,	**Saida**	2440	233	4	42	8	wood	19	1	1	2010	11 15-c.m. 5-ton Uchatius, 1 l.	..	1878	..	12·00	320	..
g. v.	**Sansego**	350	111	7	23	0	wood	9	0	1	290	2 15-c.m. 3-ton Wahrendorf	..	1861	..	9·00	45	..
to. b. g.	**Satellite**	500	..		..		steel	..		2	..	..	..	Bldg.	..	21·0	..	..
Torpedo vessel.	**Sebenico**	840	187	0	26	3	steel	12	2	2	2600	4 9-c.m. Uchatius, 2 M., 1 l.	..	1882	..	14·00	200	..
,,	**Spalato**	840	179	6	26	3	steel	12	2	2	2600	4 9-c.m. Uchatius, 7 M., 1 l.	..	1879	..	14·00	150	..
Torpedo cruiser	**Tiger**	1675	233	0	32	10	steel	15	5	2	5600	4 12-c.m., 2¼-ton B.L.R., 10 M.	..	1887	..	18·0	300	..
to. g. b.	**Trabant.**	480	210	0	23	0	steel	8	3	2	3500	10 Q.F.	1 l. car.	1890	..	20·0	..	..
Torpedo vessel	**Zara** (School ship)	840	179	6	26	3	steel	12	2	2	2600	4 9-c.m. Uchatius, 7 M., 1 l.	..	1879	.	14·00	150	..
corv.	**Zrinyi**	1340	190	6	32	10	composite	16	1	1	1170	2 15-c.m. 3-ton Wahrendorf, 5 l., 2 M.	..	1871	..	11·00	160	..

Paddle-wheel vessels, Andreas-Hofer, Fantasie, Greif, Miramar, Taurus.

Two screw gunboats, the Gemse and Grille, of 320 tons displacement and 360 indicated horse-power.

Also Yachts, Harbour Service and Training Ships, Transports, &c.

Torpedo Boats. Of the First Class, *eighteen* in number, of the Falke and Habicht types, of 83 to 88 tons displacement, 825 to 900 I.HP., and *five* of 83 tons displacement, and 1000 I.HP. Each of them is armed with two machine guns; *thirty-one* of from 37 to 64 tons displacement, and 450 to 700 horse-power, 18 to 20 knots; and *eight* of 27 tons displacement, and 300 horse-power, 15 to 18 knots.

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BRAZIL.—Armoured Ships.

c.b., central-battery ship; *c.s.*, coast-service vessel; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Battery on Turret.	Backing. Deck Plating.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
River Monitor.	Alagôas . . (wood)	340	120 0	28 0	4½	4½ on turret	14½	4 10	2	180	1 70-pdr. Whitworth M.L.R.	..	1886	..	7·00	..	..
t.	Aquidaban (steel copper-sheathed)	4950	280 0	52 0	11 comp.	11½ comp., 10 comp. on turret	10 2″	18 0	2	6200	4 9-in. 20-ton B.L.R. (Armstrong) 4 70-pdr. 5-ton do., 15 M.	5 f. tu. or l. car.	1885	345,000*	15·00	600	..
c.s., *t.*	Bahia . . (iron)	1000	178 0	35 0	4½	5½ on turret	10⅝	8 6	2	1640	2 7-in. M.L.R. (Whitworth), 2 M.	..	1865	..	10·00	..	..
c.s., *c.b.*	Brazil . . (iron)	1518	179 8	35 0	4½	4½ on turret	8	12 5	1	1500	4 7-in. M.L.R. (Whitworth), 4 68-pdr., 4 l., s b.	..	1864	60,000	11·30	..	..
t.	Javary . . (iron)	3700	240 0	58 0	12	13 on turret	9¾ 3″	11 5	2	2500	4 10-in. Whitworth M.L.R., 6 5-in. B.L.R., 5 M.	..	1875	..	11·20	200	680
c. s., *t.*	Lima-Barros . (iron)	1350	180 0	36 0	4½	4½ on turret	8½	13 5	2	2100	4 7-in. Whitworth M.L.R. .	..	1866	..	12·00	200	..
River Monitor	Maranhao . .	..	..	..	..	..	..	..	..	..	.. .. ..	..	Bldg.	..	..	..	..
cs., *c.b.*	Mariz-e-Barros (iron)	1444	198 10	36 0	4½	4½ on turret	8	10 10	2	600	4 7-in. Whitworth M.L.R. .	..	1866	..	9·00	..	..
River Monitor	Pernambuco . .	..	..	..	..	..	..	..	..	..	.. .. ..	..	Bldg.	..	..	..	..
River Monitor	Piauhy . . (wood)	340	120 0	28 0	4½	4½ on turret	14½	4 10	2	180	1 70-pdr. Whitworth M.L.R. .	..	1887	..	7·00	..	..
t.	Riachuelo (steel copper-sheathed)	5700	305 0	52 0	11 comp.	11 comp., 10 comp. on turret	10 2″	19 6	2	7300	4 9-in. 20-ton B.L.R. (Whitworth, altered by Armstrong), 6 5½-inch 5-ton do., 15 M.	5 f. tu. or l. car.	1883	365,000*	16·71	800	4,500 (at 15 knots)
River Monitor	Rio Grande . (wood)	340	120 0	28 0	4½	4½ on turret	14½	4 10	2	180	1 70-pdr. Whitworth M.L.R. .	..	1888	..	7·00	..	..
c.b.	Sete de Setembro (wood)	2145	219 10	46 6	4½	4½	..	12 6	2	2000	4 9-in. 18-ton Whitworth M.L.R., 5 M.	..	1874	..	12·00	..	..
t.	Solimões . . (iron)	3700	240 0	58 0	12	13 on turret	9¾ 3″	11 5	2	2200	4 10-in. 25-ton Whitworth M.L.R., 5 M.	..	1875	..	11·20	200	680

* Exclusive of guns and ammunition.

NOTE.—The Brazil and Lima-Barros are now used as Stationary Floating Batteries.

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BRAZIL.—Unarmoured Ships.

corv., corvette; *cr.*, cruiser; *g.v.*, gun-vessel; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes; P., continuous protective deck with thickness of plating under.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
cr.	**Almirante Barroso**	1960	213 5	36 2	steel (wood sheathed.)	17 5	1	2200	8 4¾-in. B.L.R., 6 M.	..	1882	..	12·00	..	..
" P. 1½"	**Almirante Tamanderi**	4023	270 0	46 0	steel (wood sheathed.)	18 4	2	7500	4 8-in. 12-ton B.L.R. (Armstrong), 12 6-in. 5-ton do., 16 M.	..	1890	..	17·00	750	..
"	**Guanabàra**	1900	200 0	41 2	wood	16 4	1	3000	9 70-pdr. Whitworth 6 M. 2 l.	..	1877	..	13·00	..	..
"	**Imperial Marinheiro** (used as a training vessel.)	726	167 0	26 3	composite	11 0	1	750	6 12-c.m. B.L.R., 1 9-c.m. do., 4 M.	..	1883	..	9·00	..	..
corv.	**Nictheroy**	1800	192 0	41 0	wood	16 0	1	1000	12 70-pdr. Whitworth 6 M.	..	1862	..	8·00	..	..
"	**Parnahyba** (Torpedo School ship)	838	170 6	26 3	composite	11 2	1	900	5 4·7 Armstrong B.L.R., 4 M.	..	1878	..	10·00	..	..
cr.	**Primeiro de Março**	726	167 3	26 3	composite	10 6	1	750	7 4½-in. Whitworth B.L.R., 4 M.	..	1881	..	9·00	..	..
cr.	**Trajano**	1400	210 2	29 6	composite	14 9	1	2400	7 4·7 Armstrong B.L.R., 4 M.	..	1873	..	13·00	..	..
cr. P.	New ship	4500	..	..	steel	..	..	5500	4 8-in. 12-ton B.L.R., 10 6 in. do., Q.F., 1 M.	..	Bldng.	..	17·0	..	..
cr. P.	New ship	2750	236 0	46 0	steel (copper sheathed.)	18 0	2	2800	2 6½ c.m. Q.F., 6 M.	4 f. tu. or l. car	Bldng.	..	14·0	..	..
cr. P. 2"–1"	New vessel	1300	210 0	35 0	steel	13 0	2	3300	6 4·7-in. Q.F., 4 6-pdr. do., 6 M.	2 f. tu. 2 l. car	Bldg. at Elswick	..	17·0	170	..
g.v.	New vessel	800	165 0	30 0	steel (wood sheathed.)	11 0	2	1200	4 4·7-in. Q.F., 3 6-pdr. do., 4 M.	2 l. car	Bldg. at Elswick	..	14·5	110	..

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Double-screw gunboats. — Guarany, Iniciadora, Pedro Affonso, Traripe, 250 to 330 tons ; 160 to 260 I.HP.

River-service gunboats. — Cabedello, Camocim, Cananéa, Carioca Marajó of 210 tons; 200 I.HP., and 8 knots speed.

Paddle river-service gunboats.—Braconnot, Lamego, Manáos, Taquary.

Paddle steamers.—Amazonas, Felippe Camarão, Fernandes Vieira, Henrique Diaz, Tramandahy, Vidal de Negreiros.

Torpedo boats.—Three first-class boats of the Coureur type improved, built by Messrs. Thornycroft, of Chiswick. They are 150 feet long, 14 feet 6 inches broad, and have a displacement of 110 tons. The speed is 25 knots on the measured mile, and 24 knots in a two hours' trial. Five first-class, built in England in 1882, of 110 ft. in length, and 12½ ft. in breadth, indicated horse-power 600, and speed 20 knots, sixteen of smaller size, second class and Spar Torpedo Boats.

Also Training and Harbour Ships and Transports.

BELGIUM.

Though Belgium has no Navy properly so called, there are about a dozen steam vessels, principally employed as packets, which are under the orders of the Government, and of which several would be found useful under certain conditions of naval warfare. Seven of these steamers are of 578 tons.

BULGARIA.

This principality is already in possession of the nucleus of a naval force in a flotilla of eleven steamers of small size, of which one is used as the Prince's Yacht.

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CHILI.—Armoured Ships.

c.b., central-battery ship; *b.*, barbette ship; *t.*, turret ship.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Battery.	Backing. Deck Plating.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
c.b.	Almirante Cochrane (iron)	3500	210 0	45 9	9	8	7¾ 3″	19 8	2	2920	6 8-in. B.L.R. 14-ton Arm., 4 57-m.m. Q.F., 3 M., 4 l.	3 f. tu. or l. car	1874	..	13·00	500	1900
c.b.	Blanco Encalada* (iron)	3500	210 0	45 9	9	8	7¾	19 8	2	3000	6 8-in. B.L.R., 4 6-pdr. Q.F., 3 M., 4 l.	2 f. tu.	1875	..	12·00	500	1900
b.	Capitan Prat (steel sheathed and coppered)	6900	328 0	60 8	12 steel schn.	..	.. 3″	21 10	2	12,000	4 24-c.m. B.L.R., 8 12 c.m. Q.F., 4 57-m.m. do., 4 47-m.m. do., 6 37-m.m. do., 7 M.	4 f. tu. or l. car	1890	391,000	19·00	400	..
t.	Huascar (iron)	1800	200 0	35 0	4½	5½ on turret	14 1½″	15 6	1	1050	2 8-in. 13-ton B.L.R., 4 4·7-in. do., 1 l., 2 M.	..	1865	..	12·00	250	..

* Torpedoed and sunk during the civil war in April 1891.

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CHILI.—Unarmoured Ships.

corv., corvette; *cr.*, cruiser; P., deck protected throughout, with thickness of plating under; *to.gb.*, torpedo gunboat; *g.v.*, gun vessel.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
corv.	Abtao (used as a transport)	1370	227 0	29 6	composite	15 6	1	1000	1 70-pr. B.L.R., 4 40-pr. do. (Armstrong), 4 M.	..	1864	..	9·00	300	..
to.gb.	Almirante Condell	750	240 0	27 6	steel	9 6	2	4500	3 14-pdr. Q.F., 4 3-pdr. do., 2 M.	4 l. car	1890	..	21·00	100	2500
to.gb.	Almirante Lynch	750	240 0	27 6	steel	9 6	2	4500	3 14-pdr. Q.F., 4 3-pdr. do., 2 M.	4 l. car	1890	..	21·00	100	2500
cr.	Angamos	1200	250 0	28 8	iron	15 4	1	1485	1 8-in. 13-ton B.L.R., 2 l.	..	1876	..	13·5	300	..
corv.	Chacabuco	1470	218 6	33 4	wood	17 4	1	1200	3 8-in., 2 70-pdrs., 4 40-pdr. (all B.L.R. Armstrong)	..	1866	..	10·00	400	..
cr.	Esmeralda P. 1″	3000	270 0	40 0	steel	18 3	2	6500	2 10-in. 25-ton Armstrong B.L.R., 6 6-in. 4-ton. do., 2 Q.F., 6 M.	3 f. tu. or l.car	1883	..	18·28	600	2200
g.v.	Magellanes	800	190 0	28 0	composite	14 9	2	1230	1 7-in. B.L.R., 1 64-pdr. M.L.R., 3 l.	..	1874	..	11·00	300	..
„	O'Higgins	1470	218 6	33 4	wood	17 4	1	1200	3 7-in. B.L.R., 4 40-pdr. do. (all Armstrong)	..	1866	..	10·00	500	..
„	Pilcomayo	790	171 0	27 4	wood	..	1	180 (nom.)	2 70-pdr. B.L.R., 2 40-pdr. do. (all Armstrong), 3 M.	..	1874	..	9·00	200	..
cr.	Presidente Errazuriz P.	2080	268 0	35 9	steel & copper sheathed	19 6	2	5400	4 15-c.m. Q.F., 2 12-c.m. do., 4 57-m.m. do., 6 M.	3 l. car	1890	..	19·0	..	4500 at 12 knots
cr.	Presidente Pinto P.	2080	268 0	35 9	steel & copper sheathed	19 6	2	5400	4 15-c.m. Q.F., 2 12-c.m. do., 4 57-m.m. do., 6 M.	3 l. car	1890	..	19·0	..	4500 at 12 knots

Note.—For list of ships employed by the belligerents in the late Chilian civil war, see page 130 of Part I.

Besides Sailing ships, there are—

Gunboats.—Five of 420 tons displacement and 7 to 10 knots speed.

Torpedo boats.—Eleven 1st class boats, mainly of 90 tons displacement, 100 feet in length, and a speed of 22 knots; 2 2nd class boats of 40 tons displacement, 50 feet long, and speed of 18 knots.

Despatch Vessel.—Amazonas of 1970 tons, 2400 horse-power, 13 knots speed, and armed with light and machine guns.

Besides transports and small steamers.

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CHINA.—Armoured Ships.

(The Chinese Navy is divided into Provincial Fleets: Canton, Foo-chow, Shang-hai, Peiho, and North Coast.)
a.g.b., armoured gunboat; *c.d.s.*, coast defence ship; *b.*, barbette ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour.		Backing.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament.		Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
					Belt.	Turret.	Deck Plating.				Guns.	Fish Torpedo Dis-chargers					
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
b.	Chen-Yuen . (steel)	7430	308 5	59 0	14 comp.	12 comp.	14 3″	20 0	2	6200	4 30½-c.m. 37-ton Krupp, 2 15-c.m. 4-ton do., 8 M., 2 l.	2 l. car.	1882	..	14·50	1000	..
b.	King-Yuen . (steel)	2850	270 0	40 0	9½	8 comp.	3″	16 6	2	3600	2 8¼-in. 10-ton B.L.R., 2 6-in. do., 7 M.	1 f. tu. sb. 3 l. car.	1887	..	16·50	325	..
c.d.s.	Ping-Yuen . (steel)	2850	200 0	40 0	8	5 barbette & conning tower.	.. 2″	16 0	2	2400	1 10·2-in. B.L. Krupp, 2 6-in. do., 8 Q.F.	4 f. tu. or l. car	1890	..	10·50	..	..
b.	Lai-Yuen . (steel)	2850	270 0	40 0	9½	8 comp.	.. 3″	16 6	2	3600	2 8¼-in. 10-ton B.L.R., 2 6-in. 4-ton do., 7 M.	1 f. tu. sb. 3 l. car.	1887	..	16·50	325	..
b.	Ting-Yuen . (steel)	7430	308 5	59 0	14 comp.	12 comp.	14 3″	20 0	2	6200	4 30½-c.m. 37-ton Krupp, 2 15-c.m. 4-ton do., 8 M., 2 l.	2 l. car.	1881	..	14·50	1000	..
a.g.b.	Tien-Sing . (wood)	195	105 0	20 4	1½	8	5	7 0	2	340	1 17-c.m. Krupp . . .	..	1875	..	10·0	..	..

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CHINA.—Unarmoured Ships.

cr., cruiser; *fr. cr.*, frigate-built cruiser; *to. gb.*, torpedo gunboat; *g.v.*, gun-vessel; P., deck protected throughout; *pp*, partial deck protected; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes; P., continuous protective deck with thickness of plates under.

Class.	NAME.	Displacement	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
cr.	Chih-Yuen . . P. 4″–2″	2300	250 0	38 0	steel	15 0	2	5500	3 8-in. 12-ton B.L.R., 2 6-in. 4-ton. do., 17 Q.F., 6 M.	4 f. tu. or l.car	1886	..	18·00	450	..
„	Ching-Yuen . . P. 4″–2″	2300	250 0	38 0	steel	15 0	2	5500	3 8-in. 12-ton B.L.R., 2 6-in. 4-ton. do., 17 Q.F., 6 M.	4 f. tu. or l.car	1886	..	18·00	450	..
„	Foo-Ching . . P. 4″–2″	2500	253 0	36 2	steel	18 0	2	2400	3 21 cm. B.L.R., 7 12 cm. do. . .	..	1890	..	15·00	..	..
„	Foo Chow . . .	1300	223 0	32 0	steel	13 3	2	1600	2 6-in. B L.R., 4 l.	..	1887	..	13·00	..	..
fr. cr.	Hai-An	2630	300 0	42 0	wood	21 0	1	1750	2 21-c.m. Krupp, 20 12-c.m. do., 4 M. .	1 l. car.	1872	..	12·00	..	..
cr.	Huan-Tai . . .	1300	223 0	32 10	steel	13 3	2	1600	2 15-c.m. B.L.R. Krupp, 5 12-c.m. do., 4 M.	2 f. tu. or l.car	1888	..	15·0	..	..
„	Kai-Chih . . .	2480	259 0	39 4	steel	15 2	..	3000	2 21-c.m. B.L.R., 6 15-c.m. do., 6 M., 5 l.	..	1884	..	15·00	..	..
to. cr.	Kong-Bin . . .	1100	..	..	steel	..	2	3400	1 15 cm. B.L.R., 1 12 cm. do., 4 M. .	..	1891	..	..	..	..
„	Kong-Hi . . .	1100	..	..	steel	..	2	3400	1 15 cm. B.L.R., 1 12 cm. do., 4 M. .	..	1891	..	..	..	..
cr.	Kuang Ki . . .	..	226 0	26 0	steel and wood	11 4	2	2400	3 12 cm. Q.F., 8 M.	4 l. car.	Bldg.	..	..	..	..
„	Kuang Kuong-Ken .	..	226 0	26 0	steel and wood	11 4	2	2400	3 12 cm. Q.F., 8 M.	4 l. car.	1891	..	..	..	..
„	Kuang Ping . . .	..	226 0	26 0	steel and wood	11 4	2	2400	3 12 cm. Q.F., 8 M.	4 l. car.	1890	..	..	..	..

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g.v.	**Mei-Yun** . . .	578	170	0	22	9	composite	9	2	1	400	1 16-c.m. Vavasseur, 2 12-c.m. Vavasseur	..	1869	..	8·00	..	..
cr.	**Nan-Schuin** . . .	2200	253	0	36	2	steel	18	1	1	2400	2 8-in. 10-ton Armstrong B.L.R., 8 4½-in. do., 4 M.	1 l. car.	1884	..	15·00	..	..
"	Two new vessels . .	2200	253	0	36	2	steel	18	1	2	2400	.. ..	..	Bldg.	..	15·00	..	..
to. cr.	One new	1100	..		..		steel	..		2	3400	1 15 cm. B.L.R., 1 12 cm. do., 4 M. .	..	Bldg.	..	..	..	..
cr.	**Nan-Thin** . . .	2200	253	0	36	2	steel	18	1	1	2400	2 8-in. 10-ton Armstrong B.L.R., 8 4½-in. do., 4 M.	1 l. car.	1883	..	15·00	..	..
"	**Tshao-Yong** . *pp.*	1350	210	0	32	0	steel	15	8	2	2677	2 10-in. 25-ton Armstrong B.L.R., 4 4·7-in. do., 10 M., 2 l.	3 f. tu. or l. car	1881	..	16·80	300	5380 (at 8 knots)
g.v.	**Tshen-Hai** . . .	578	160	10	26	3	wood	10	6	1	480	1 6½-ton Armstrong M.L.R., 4 5-in. B.L.R.	..	1872	..	10·00	..	..
cr.	**Tsi-Yuen** . . P. 4″–2″	2355	236	3	33	0	steel	15	9	2	2800	2 21-c.m. (35 calibre) Krupp, 1 15-c.m. do., 4 l., 6 M.	4 tu.	1886	..	15·0	230	..
g.v.	**Tsing-Yuen** . . .	578	160	10	26	3	wood	10	6	1	480	1 6½-ton Armstrong M.L.R., 4 5-in. B.L.R.	..	1872	..	10·00	..	..
cr.	**Yang-Tao** . . .	2500	253	0	36	2	steel	18	0	2	2400	3 8-in. 10-ton B.L.R., 7 4¾-in. do.	..	1883	..	15·00	..	..
"	**Yang-Wai** . . *pp.*	1350	210	0	32	0	steel	15	8	2	2580	2 10-in. 25-ton Armstrong B.L.R., 4 4½-in. do., 10 M., 2 l.	3 f. tu. or l. car	1881	..	16·00	300	5370 (at 8 knots)
to. gb.	Not named (X.) . .	450	200	0	23	0	steel	8	3	2	2700	1 4-in. B.L.R., 4 M.	4 l. car.	1888	..	19·0	100	..
"	**Ye-Sing** . . .	2500	253	0	36	0	steel	18	0	1	2400	3 8-in. 10-ton B.L.R., 7 4¾-in. do.	..	1888	..	15·00	..	..

Gunboats (*Rendel's System*).—Eleven of 325 to 440 tons displacement; 235 to 450 indicated horse-power, named with letters of Greek alphabet.

Gunboats (*Canton Flotilla*).—Thirteen of 100 to 350 tons displacement.

Floating Batteries.—Six with 3 12-ton Armstrong guns in a wooden fixed turret for river service.

Torpedo boats.—Twenty-two First-class, of which one is 160 ft. long, 19½ ft. broad, of 1500 horse-power, and 23 knots speed, and nine Second-class boats.

Also paddle-wheel vessels, transports, &c.

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DENMARK.—Armoured Ships.

cr., cruiser; *br.*, broadside ship; *c.s.*, coast-service vessel; *t.*, turret ship; f.tu., fixed tubes, and l. car., launching carriages for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Battery or Turret.	Backing. Deck Plating.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
cr.	**Absalon** . . (iron)	527	150 0	26 0	2½	2½	6	10 2	1	500	4 7½-c.m. B.L.R. Krupp, 4 M. .	..	1862	..	10·00	65	..
br.	**Denmark** . . (iron)	4747	270 0	49 6	4½	4½	18	19 10	1	1007	12 8-in. 9 ton Armstrong M.L.R., 12 6-in. Finspong M.L.	..	1864	260,000	8·00	625	..
Torpedo School Ship	**Esbern Snare** . (iron)	527	150 0	26 0	2½	2½	6	10 2	1	500	2 M., 2 l.	2 f. tu. or l.car	1862	..	10·00	65	..
c.s., t.	**Gorm** . . . (iron)	2344	231 0	40 0	7	8 turret	10	14 0	2	1670	2 10-in. 18-ton Armstrong M.L.R., 3 8·7-c.m. Krupp, 4 M.	..	1870	104,000	12·25	115	..
t.	**Helgoland** . . (iron)	5347	257 6	59 2	12	10	10 2″	18 8	2	4000	1 30½-c.m. 36-ton Krupp, 4 26-c.m. 22-ton do., 5 12½-c.m. do. 10 M.	4 f. tu. or l.car	1878	275,000	12·00	230	1070
c.s., t.	New ship . . (steel)	4500	Design	not yet	approv	ed.	..	..	..	..	.. ..	..	Bldng.	..	..	..	..
b.	**Iver Hvitfeldt** (steel)	3260	242 0	49 6	12	8 on barbettes	.. 2″	18 0	2	5000	2 26-c.m. 28-ton Krupp, 6 12-c.m. do., 10 M.	4 f. tu. or l.car	1886	200,000	15·60	250	..
c.s., t.	**Lindormen**. . (iron)	2076	216 0	39 5	5	5 turret	9¾	13 9	2	1560	2 9-in. 13-ton Armstrong M.L.R., 3 8·7-c.m. Krupp 4 M.	..	1868	93,000	12·00	120	..
c.b.	**Odin** . . . (iron)	3083	237 0	50 0	8	8	10	15 6	1	2260	4 10-in. 18-ton Armstrong M.L.R., 4 8·7-c.m. Krupp B.L.R., 6 M.	..	1872	147,000	12·40	180	560
br.	**Peder Shram** . (wood) (Harbour Service)	2373	220 0	48 5	5	4½	..	20 7	1	1680	8 8-in. 9-ton Armstrong M.L.R., 8 6-in. Finspong, & 12·26 do.	..	1864	..	11·70	300	1589
t.	**Rolf Krake**. . (iron)	1344	185 2	38 3	4½	4½	9 1″	10 6	1	750	2 8-in. 9-ton Armstrong, 2 8·7-c.m. Krupp, 4 M.	..	1863	74,000	7·80	135	..
Torpedo Ship	**Tordenskiold** . (steel)	2400	221 6	43 3	..	8 (steel)	.. 4″–2″	15 6	2	2600	1 30½-c.m. 52-ton Krupp, 4 12-c.m. do., 8 M.	4 f. tu. or l.car	1880	138,900	14·00	170	..
t.	New ship . . . (steel)	3290	243 0	49 3	12	11½ 8¼ turret	.. 2″	11 6	2	5100	2 26-c.m. 28-ton B.L. Krupp, 4 12-c.m. do., 12 M.	4 f. tu. or l.car	Bldng.	..	15·5	285	..

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DENMARK.—Unarmoured Ships.

corv., corvette; *cr.*, cruiser; *fr. cr.*, frigate-built cruiser; *g.v.*, gun-vessel; P., deck protected throughout; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes; P., continuous protective deck with thickness of plating under.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull. / *Protective Deck.*	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Torpedoes.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
corv.	**Dagmar** (school ship) .	1193	173 10	33 10	wood	16 0	1	800	8 5½-in. 4¾-ton Krupp, 4 M. .	..	1861	50,000	9·50	150	..
g.v.	**Diana**	556	154 6	26 3	wood	10 2	1	500	6 7½-c.m. Krupp, 2 M. . .	..	1863	33,000	9·00	60	..
"	**Falster** . . .	356	111 0	28 10	iron	7 6	2	510	1 10-in. 20-ton Armstrong M.L.R., 2 7½-c.m. Krupp, 2 M. . .	..	1873	33,000	9·80	20	..
fr. cr.	**Fyen** . . . P. 1¾"	2596	226 6	45 6	steel copper sheathed	18 1	1	2700	4 long 15-c.m. 4¾-ton Krupp, 14 15-c.m. 3½-ton short do., 8 M.	2 f. tu. or l.car	1882	170,000	13·00	290	..
g.v.	**Fylla**	556	154 0	26 3	wood	10 2	1	500	6 7½-c.m. Krupp, 2 M. . . .	..	1862	33,000	9·00	60	..
cr. (3rd class)	**Geiser** . . . P. 1½"	1280	257 6	27 6	steel	..	2	3000	2 4·7-in. Q.F., 4 57-cm. do. . .	4 l. car.	1891	..	17·50	..	..
cr. (3rd class)	**Heimdal** . . P. 1½"	1280	257 6	27 6	steel	..	2	3000	2 4·7-in. Q.F., 4 57-cm. do. . .	4 l. car.	Bldng.	..	17·50	..	..
cr.	**Hekla** . . . P. 1½"	1280	233 0	32 10	steel	11 2	2	3000	2 6-in. Q.F., 4 57-cm. do., 7 M. .	2 l. car.	1890	..	17·00	..	..
g.v.	**Ingolf**	870	192 0	28 0	iron	12 6	1	670	2 15-c.m. Krupp, 4 7½-c.m. do., 2 M.	..	1876	44,000	10·50	130	..
fr. cr.	**Jylland** . . .	2457	200 3	44 3	wood	19 5	1	1350	20 6-in. Finspong M.L.R., 6 12-c.m. Krupp, 4 M.	..	1860	84,000	11·00	260	..
g.v.	**Moen**	356	111 0	28 10	iron	7 6	1	523	1 10-in. 20-ton Armstrong M.L.R., 2 8·7-c.m. Krupp, 2 M.	..	1875	..	9·20	20	..
corv.	**Saint Thomas** . .	1572	224 0	33 0	wood	17 0	1	1870	1 8-in. 9-ton Armstrong M.L.R., 4 12-c.m. Krupp, 3 M.	..	1871	..	13·00	190	..
cr.	**Valkyrien** . . P. 2½"	2900	268 0	43 6	steel	18 0	2	5000	2 long 21-c.m. 10-ton Krupp, 6 15-c.m. long 4¾-ton Krupp, 10 M.	5 f. tu. or l.car	1887	..	17·00	450	..

Gunboats.—Seven in number, of 150 to 240 tons; 200 to 400 indicated horse-power.

Torpedo boats.—Five sea-going, of about 96 tons, 1300 indicated horse-power and 21 to 22 knots speed. Also three of 60 to 82 tons. Of *second class* boats, there are ten built of 15 to 17 tons, and of about 17 knots speed.

In addition there are paddle wheel vessels, school and training ships, a Royal Yacht and a torpedo Transport.

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EGYPT.

The ships now belonging to Egypt are:—

Mehemet Ali, an unarmoured iron frigate, 290 feet long, 36 feet broad; draught of water, 16 feet; displacement, 1762 tons. She is armed with 20 12-c.m. Krupp guns of 20 cwt. each, and 10 40-pdr. Armstrongs. The machinery has been removed. She is now used as a guard ship at Alexandria.

Sakkeh, a wood corvette, 210 feet long, 29 feet broad, 14½ feet draught of water, and 972 tons displacement. She is used as a guard ship at Port Said, and is armed with 10 40-pdr. B.L. Armstrongs. At present there is no machinery on board.

Mahroussa, paddle-wheel yacht of the Khedive. She is 440 feet long, 42 feet broad; draught of water, 20 feet; and displacement 4200 tons.

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FRANCE.—Armoured Ships.

a.c., armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t.*, turret ship, f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length at Water Line.	Beam.	Armour. Belt.	Armour. Battery or Turret.	Backing. Deck Plating.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
a.g.b.	Achéron . (steel)	1640	181 0	40 4	8	8	.. 2½″	11 10	2	1700	1 27-c.m. 28-ton B.L.R., 2 10-c.m. do., 2 M.	..	1885	100,000	13·00	..	..
c.b.	Alma (*d*) . (wood)	3770	229 10	46 6	5⅞	4¾	26	23 11	1	1896	6 19-c.m. B.L.R., 4 12-c.m. do.	..	1867	101,200	11·89	..	..
b.	Amiral Baudin . (iron & steel)	11,380	321 6	69 10	21½	16½ steel	14 4″	26 2	2	8320	3 37-c.m. (75 ton) B.L.R., 12 14-c.m. do., 8 M.	f. tu.	1883	600,000	15·00	800	3000
b.	Amiral Duperré (iron & steel)	11,100	311 0	66 11	21½	15½	14 2¼″	26 9	2	8000	4 34-c.m. (48 ton) B.L.R., 1 16-c.m. do., 14 14-c.m. do., 12 M.	f. tu. or l. car.	1879	570,000	14·22	..	..
b.	Bayard . (wood)	6000	265 9	57 2	10	8	15 2″	24 11	2	4000	4 24 c.-m. 16-ton B.L.R., 2 19-c.m. 8-ton do., 6 14-c.m. 3-ton do., 12 M., 2 l.	..	1880	..	14·00	400	..
c.s., t.	Bélier (*d*) . (wood)	3600	217 0	53 0	8½	7	31½	19 1	2	1921	2 24-c.m. 16-ton B.L.R. . .	..	1870	..	12·37	180	..
c.s., t.	Bouledogue (*d*) (wood)	3400	217 0	53 0	8½	7	31½	18 2	2	1827	2 24-c.m. 16-ton B.L.R. . .	..	1872	..	12·25	180	..
t.	Bouvines . .	6590	285 0	58 4	17¾	14½ Turret base, 12½	.. 4″	22 0	2	7500	2 30-cm. B.L.R., 4 10-cm. Q.F., 4 47-mm. do., 4 37-mm. do.	2 f. tu. or l.car	1892	556,000	17·0	..	..
t.	Brennus (steel)	10,983	361 0	67 0	15¾ comp. 4¾ above	15¾ comp. & 4-in. on battery.	.. 4¾″	26 3	2	14,000	3 34-c.m. 58-ton B.L.R., 10 16-c.m. do., 4 6½-c.m. Q.F., 8 47-mm. do., 8 M.	5 f. tu. or l.car	1891	804,000	17·5	..	..
a.c.t.	Bruix . (steel)	4745	348 0	46 0	3½	..	.. 2½″	19 2	2	8300	2 8-ton. B.L.R., 6 14-c.m. 3-ton do., 14 Q.F. and M.	..	Bldg.	360,000	19·00	..	..
c.s.b.	Caiman (iron and steel)	7230	278 3	59 0	19½	17¾	12 3″	24 7	2	8000	2 42-c.m. 75-ton B.L.R., 4 10-c.m. do., 4 M.	..	1885	..	14·50	500	..
a.c.t.	Chanzy . (steel)	4745	348 0	46 0	3½	..	.. 2½″	19 2	2	8300	2 8-ton B.L.R.. 6 14-c.m. 3-ton do., 14 Q.F. and M.	..	Bldg.	360,000	19·00	..	..

(*d*) Ships marked thus are, it is stated, unfit for service without repair.

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FRANCE.—Armoured Ships—*continued.*

***a.c.*, armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t.*, turret ship;** f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length at Water Line.	Beam.	Armour. Belt.	Armour. Battery or Turret.	Backing. Deck Plating.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
t.	**Charles Martel** (steel)	11,882	392 6	71 3	17¾	14½ 4-in. on upper works	.. 2¾″	26 3	2	12,000	2 30-c.m. B.L.R., 2 27-c.m. do., 8 14-c.m. do., 4 65-mm. Q.F., 8 47-mm. do., 10 37-mm. do.	6 f. tu. or l.car	Bldg. at Brest	..	18·00	..	..
a.c.t.	**Charner** . (steel)	4745	348 0	46 0	3½	..	.. 2½″	19 2	2	8300	2 8-ton B.L.R., 6 14-c.m. 3-ton do., 14 Q.F. and M.	..	Bldg.	360,000	19·00	..	..
a.c.t.	**New** . . (steel)	5000	..	..	..	..	..	..	..	[illegible]	2 19-c.m. B.L.R., 6 14-c.m. Q.F.	..	..	..	20·00	..	..
a.g.b.	**Cocyte** . (steel)	1640	181 0	40 4	8	8	.. 2½″	11 10	2	1700	1 27-c.m. 28-ton B.L.R., 2 10-c.m. do., 2 M.	..	1887	100,000	13·00	..	..
c.b.	**Colbert** . (wood)	8457	317 9	56 6	8½	6¼	34	28 5	1	4652	8 27-c.m. 23-ton B.L.R., 2 24-c.m. 16-ton do., 6 14-c.m. 3-ton do., 8 M.	..	1875	..	14·47	590	..
c.b. & b.	**Courbet** (iron & steel), was Foudroyant.	9700	312 0	67 0	15	9½	.. 2½″	25 0	2	8100	4 34-c.m. 48-ton B.L.R., 4 27-c.m. 28-ton do., 6 14-c.m. 3-ton do., 12 M.	4 f. tu. or l. car.	1881	800,000	14·20	628	3100
c.b. & b.	**Dévastation** (iron & steel)	10,100	312 0	67 0	15	9½	12½ 2½″	25 0	2	8320	4 34-c.m. 48-ton B.L.R., 4 27-c.m. 23-ton do., 6 14-c.m. 3-ton do., 8 M.	4 f. tu. or l. car.	1879	..	15·17	610	2800
b.	**Duguesclin** (steel, sheathed with copper	5869	266 0	57 0	9	8 barbettes compound	15 2″	25 3	2	4100	4 24-c.m. 16-ton B.L.R., 1 19-c.m. 8 ton do., 6 14-c.m. 3-ton do., 2 Q.F., 12 M.	..	1883	220,000	14·00	400	..
a.c.	**Dupuy de Lôme**	6297	376 0	51 6	4	4	.. 2″	23 0	3	14,000	2 19-c.m. 8-ton B.L.R., 6 16-c.m. 5-ton do. (or may be Q.F.), 8 Q.F., 8 M.	4 f. tu. or l.car	1890	Estimated 416,000	20·0	..	4000

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a.g.b.	**Flamme** . (special metal)	1045	165	0 32	7	10	4-in. shield	.. 2″	10	4	2	1500	1 24-c.m. 16-ton B.L.R., 1 9-c.m. do., 2 M.	1 f. tu.	1885	68,000	13·00	50	..
b.	**Formidable** (steel)	11,441	321	6 69	6	21½	17¾	14 3″	26	2	2	6500 8320 forced draught.	3 37-c.m. 75 ton B.L.R., 12 14-c.m. 3-ton do., 8 M.	f. tu.	1885	467,520 hull, 85,800 machinery.	15·00	600	..
c.b. & b.	**Friedland** . (iron)	8540	317	0 58	0	8	7	15	29	11	1	4428	8 27-c.m. 23-ton B.L.R., 8 14-c.m. 3-ton do., 1 12 c.m. do., 8 M.	2 f. tu. or l. car.	1873	..	13·30	630	..
c.s., t.	**Fulminant** (iron and steel)	5574	248	0 57	9	13	12	16 2″	21	4	1	3550	2 27-c.m. 23-ton B.L.R., 4 12-c.m. do., 4 M.	2 l.car.	1877	..	13·22	275	..
c.s., b.	**Furieux** (iron & steel)	5700	247	10 59	0	20	17¾	.. 3½″	21	9	2	4000	2 34-c.m. 48-ton B.L.R., 4 10-c.m., 4 M.	..	1883	264,640	14·00	290	1500
a.g.b.	**Fusée** . (steel, copper sheathed)	1045	165	0 32	7	10	4-in. shield	.. 2″	10	4	2	1500	1 24-c.m. 16-ton B.L.R., 1 9 c.m. do., 2 M.	1 f. tu.	1884	68,000	13·00	50	..
"	**Grenade** (steel, copper sheathed)	1045	165	0 32	7	10	4-in. shield	.. 2″	10	4	2	1500	1 27-c.m. 16-ton B.L.R., 1 9-c.m. do., 2 M.	1 tu.	Bldg.	68,000	13·00	50	..
c.b.	**Héroine** . (iron)	5887	262	5 56	0	6	4½	26	27	7	1	3318	8 24-c.m. 16-ton B.L.R., 3 19-c.m. 8-ton do., 4 14-c.m. 3-ton do., 6 M.	..	1863	213,000	13·00	500	..
t. & b.	**Hoche** (iron & steel)	10,650	333	0 65	7	18	16	.. 3″	27	3	2	7000	2 34-c.m. 52-ton B.L.R., 2 27-c.m. 28-ton do., 18 14-c.m. 3-ton do., 8 M.	4 f. tu. or l. car.	1886	380,000 hull, 120,000 machinery	16·0	600	4000
c.s., b.	**Indomptable** (iron and steel)	7168	279	10 59	0	20	17½	.. 3″	23	6	2	6000	2 42-c.m. 75-ton B.L.R., 4 10-c.m., 4 M.	..	1883	..	14·50	800	..
t.	**Jauréguiberry** . (steel)	11,818	356	0 72	8	17¾	14½ 4-in. on upper works	.. 2¾″	27	9	2	13,275	2 30-c.m. B.L.R., 2 27-c.m. do., 8 14-c.m. do., 4 65-mm. Q.F., 12 47-mm. do., 8 37-mm. do.	6 f. tu. or l.car	Bldg.	..	18·0	..	..
c.s., t.	**Jemmapes** . .	6590	285	0 57	4	17¾	17¾	.. 4″	22	0	2	7500	2 30-c.m. B.L.R., 4 10-c.m. Q.F., 4 47-m.m. do., 4 37-m.m. do.	2 f. tu. or l.car	Bldg.	500,000	16·5	..	..
c.b. & b.	**La Galissonnière** . (wood)	4700	255	8 49	0	6	4¾	26	23	9	2	2370	6 24-c.m. 16-ton B.L.R., 6 14-c.m. 3-ton do., 6 M.	..	1872	..	13·08	500	..

(*d*) Ships marked thus are, it is stated, unfit for service without repair.

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FRANCE.—Armoured Ships—*continued.*

***a.c.*, armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.**

Class.	NAME.	Displacement.	Length at Water Line.	Beam.	Armour. Belt.	Armour. Battery or Turret.	Backing. Deck Plating.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
a.c., t.	**Latouche Treville** (steel)	4745	348 0	46 0	3½	3¾ conning tower.	.. 2½″	19 2	2	8300	2 8-ton B.L.R., 6 47-c.m. 3-ton do., 14 Q.F. and M.	..	Bldg.	360,000	19·00	..	..
t.	**Lazare Carnot** (steel)	11,986	380 0	70 6	17¾	14½ 4-in on upper works	.. 2¾″	26 0	2	12,400	2 30-c.m. B.L.R., 2 27-c.m. do., 8 14-c.m. do., 4 65-m.m. Q.F., 8 47-m.m. do., 10 37-m.m. do.	6 f. tu. or l.car	Bldg. at Toulon	..	18·0	..	..
b.	**Magenta** (iron and steel)	10,581	330 0	65 7	18	16	.. 3″	27 3	2	7000	4 34-c.m. 52-ton B.R.L., 17 14-c.m. 3-ton do., 20 M.	4 f. tu. or l. car.	1890	760,960	15·00	600	4000
b.	**Marceau** (iron & steel)	10,581	330 0	65 7	18	16	.. 3″	27 3	2	7000	4 34-c.m. 52-ton B.L.R., 17 14-c.m. 3-ton do., 20 M.	4 f. tu. or l.car	1887	769,080	16·4	600	4000
c.b. & b.	**Marengo** . (wood)	7900	282 6	56 10	8	6¼	32	27 8	1	3673	4 27-c.m. 27-ton B.L.R., 4 24-c.m. 16-ton do., 7 12-c.m. do., 12 M.	..	1869	280,000	13·49	650	..
t.	**Massena** (steel)	11,700	363 6	65 6	17¾	..	..	26 3	3	11,000	2 30-c.m. B.L.R., 2 27-c.m. do., 8 14-c.m. Q.F., 4 20-pdr. do., 4 9-pdr. do., 12 3-pdr. do., 10 M. (1-pdr. Hotchkiss)	4 f. tu. or l.car	Bldg.	..	18·00	585	4000
a.g.b.	**Mitraille** (steel, sheathed with copper)	1045	165 0	32 7	10	4-in. shield	.. 2″	10 4	2	[illegible]	1 27-c.m. 16-ton B.L.R., 1 9-c.m. do., 2 M.	1 f. tu.	1886	70,000	13·00	50	..
c.b.	**Montcalm** (*d*) (wood)	3621	230 3	46 1	5⅞	4¾	26	23 7	1	1830	6 19-c.m. 8 ton B.L.R., 4 12-c.m., do., 8 M.	..	1868	..	11·65	..	..
b.	**Neptune** (iron & steel)	10,581	330 0	65 7	18	16 barbettes	.. 3″	27 3	2	7000	4 34-c.m. 52-ton B.L.R., 17 14-c.m. 2½-ton do., 20 M.	4 f. tu. or l. car.	1887	780,000 including armament	15·00	600	4000

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t.	New Ship	(steel)	11,700	363	6	65	6	17¾	..	..	26	3	3	11,000	2 30-c.m. B.L.R., 2 27-c.m. do., 8 14-c.m. Q.F., 4 20-pdr. do., 4 9-pdr. do., 12 3-pdr. do., 10 M. (1-pdr. Hotchkiss)	4 f. tu. or l.car	Bldg.	..	18·00	585	4000
c.b. & b.	Océan	(wood)	7500	282	6	56	10	8	6¼	32	27	3	2	3781	4 27-c.m. 23-ton B.L.R., 4 24-c.m. 16-ton do., 8 14-c.m. 3-ton do., 8 M.	..	1868	..	13·70	650	..
c.s., t.	Onondaga (*d*)	(iron)	2600	228	4	51	2	5½	12¾	12 1″	12	7	2	642	4 24-c.m. 16-ton B.L.R.	..	1863	..	6·46	170	..
a.g.b.	Phlégéthon	(steel)	1640	181	10	40	4	8	8	.. 2½″	11	10	2	1700	1 27-c.m. 28-ton B.L.R., 1 12-c.m. do., 2 M.	..	1890	142,000	13·00	..	..
c.b. & b.	Redoutable	(iron & steel)	8860	318	2	64	8	14	9½	15 2½″	25	6	2	6071	8 27-c.m. 24-ton B.L.R., 6 14-c.m. 3-ton. do., 8 M.	..	1876	..	14·66	510	2800
c.s., b.	Requin	(iron & steel)	7200	279	10	59	0	19½	17¾	.. 3″	24	7	2	6000	2 42-c.m. 75-ton B.L.R., 4 10-c.m. do., 4 M.	..	1885	..	14·00	500	..
c.b.	Revanche (*d*)	(wood)	5819	262	5	55	10	6	4½	26	27	1	2	3187	8 24-c.m. 16-ton B.L.R., 3 19-c.m. 8-ton do., 4 14-c.m. 3-ton do.	..	1865	..	13·25	500	..
c.b. & b.	Richelieu	(wood)	9100	323	6	57	10	8½	6¼	..	27	11	2	4006	6 27-c.m. 23-ton B.L.R., 5 24-c.m. 16-ton do., 8 14-c.m. 3-ton do., 12 M.	..	1873	..	13·11	640	..
a.g.b. & b.	Styx	(steel)	1640	181	10	40	4	8	8	.. 2½	11	10	2	1700	1 27-c.m. 27-ton B.L.R., 1 12-c.m., 2 M.	..	Bldg.	142,000	13·00	..	..
c.b. & b.	Suffren	(wood)	7600	282	6	57	10	8	6¼	32	29	10	1	4288	4 27-c.m. 23-ton B.L.R., 4 24-c.m. 9½-ton do., 6 14-c.m. 3-ton do., 12 M.	4 f. tu. or l. car.	1870	..	14·30	700	..
c.s., b.	Taureau (*d*)	(wood)	2700	194	9	47	3	6	4¾	26	17	9	2	1800	1 27-c.m. 24-ton B.L.R.	..	1865	..	12·54	170	..
c.r., t.	Tempête	(iron & steel)	4523	248	0	57	9	13	12	15¾ 2″	16	9	1	1745	2 27-c.m. 28-ton B.L.R., 4 M.	..	1876	..	10·20	120	..
c.s., b.	Terrible	(iron & steel)	7200	279	10	59	0	19½	17¾	.. 3″	24	7	2	6000	2 42-c.m. 75-ton B.L.R., 4 10-c.m. do., 4 M.	..	1881	..	14·50	500	..
c.b.	Thétis (*d*)	(wood)	3621	230	3	46	2	6	4¾	26	20	10	1	1859	6 19-c.m. 8-ton B.L.R., 4 14-c.m. do., 6 M.	..	1877	..	12·00	250	..

(*d*) Ships marked thus are, it is stated, unfit for service without repair.

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FRANCE.—Armoured Ships—*continued.*

a.c., armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t.*, turret ship, f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length at Water Line.	Beam.	Armour. Belt.	Armour. Battery or Turret.	Backing. Deck Plating.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Discharges	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
c.s., t.	Tigre (d) . (wood)	3600	216 6	52 10	9	7	..	18 9	2	1880	2 24-c.m. 16-ton B.L.R. .	..	1871	..	12·09	180	..
c.s., b.	Tonnant (iron & steel)	4707	248 7	58 5	18	14½	15¾ 3″	17 3	1	1760	2 34-c.m. 48-ton B.L.R., 4 M. .	..	1880	..	11·00	120	..
c.s., t.	Tonnerre (iron & steel)	5700	248 0	57 9	13	12	15¾ 2″	21 4	1	4165	2 27-c.m. 28-ton B.L.R., 4 10-c.m. 4 M.	..	1875	..	14·01	285	..
t.	Tréhouart . (steel)	6590	285 0	58 4	17¾	14½ Base of turret, 12¼	.. 4″	22 0	2	7500	2 30-c.m. B.L.R., 4 10-c.m. Q.F., 4 47 m.m. do., 4 37 m.m. do.	2 f. tu. or l. car	*	556,000	17·0	..	..
c.b. & b.	Trident . (wood)	8800	317 9	56 4	8½	6¼	34	29 1	1	4652	8 27-c.m. 23-ton B.L.R., 2 24-c.m. 16-ton do., 6 14-c.m. 3-ton do., 4 M.	2 f. tu. or l. car.	1876	..	14·17	540	..
"	Triomphante (wood)	4700	258 2	48 9	..	4¾	26	22 5	1	2200	6 24-c.m. 16-ton B.L.R., 1 19-c.m. 8-ton do., 8 14-c.m. 3-ton do., 1 12-c.m. do.	..	1877	..	12·89	500	..
b.	Turenne . (wood)	6400	265 9	57 2	10	8	15 2″	23 11	2	3955	4 24-c.m. 16-ton B.L.R., 2 19-c.m. 8-ton do., 6 14-c.m. 3-ton do., 12 M.	..	1879	..	14·14	400	..
c.s., t.	Valmy . . .	6590	285 0	57 4	17¾	17¾	.. 4″	22 0	2	7500	2 34-c.m. B.L.R., 4 10-c.m. Q.F., 4 47 m.m. do., 4 37 m.m. do.	2 f. tu. or l. car	Bldg.	556,000	17·0	..	..
b.	Vauban . (steel)	5900	267 9	57 3	10	8	15 2″	24 0	2	4060 (forced draught)	4 24-c.m. 16-ton B.L.R., 1 19-c.m. do., 614-c.m. 3-ton do., 12 M.	..	1882	..	14·32 forced draught	400	..
c.s., t.	Vengeur (iron & steel)	4523	248 0	57 9	13	12	15¾ 2″	16 9	2	2319	2 34-c.m. 48-ton B.L.R., 4 M. .	..	1878	..	10·83	120	..
c.b. & b.	Victorieuse (wood)	4600	258 2	48 9	6	4¾	26	22 5	1	2214	6 24-c.m. 16-ton B.L.R., 1 19-c.m. 8-ton do., 4 14-c.m. 3-ton do., 2 10-c.m. do.	..	1875	..	12·75	300	..

(d) Ships marked thus are, it is stated, unfit for service without repair.

* Building at Lorient.

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The following armoured ships and vessels are, it is stated, unfit for service or for repair :—

Class.	When Built.	NAME.	Displacement in Tons.	Indicated Horse-Power.	Speed in Knots.
c.b.	1868	**Atalante** . . .	3800	1640	11·43
c.b.	1865	**Belliqueuse** . . .	3706	1227	11·78
c.s., t.	1868	**Cerbère**	3800	1800	11·39
c.b.	1864	**Flandre**	5997	3536	13·30
Floating battery	1867	**Imprenable** . . .	1420	411	5·51
Floating battery	1866	**Protectrice** . . .	1420	..	6·00
c.b.	1863	**Provence** . . .	5819	3064	13·7
c.b.	1868	**Reine Blanche** . .	3900	1860	11·8
c.b.	1864	**Savoie**	6000	3318	13·47
c.b.	1864	**Valeureuse** . . .	5774	3383	13·83

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FRANCE.—Unarmoured Ships.

The divisions of the French unarmoured ships follow the official classification. The designation of each class is made, wherever practicable, to correspond with the usual parallel English equivalent. The French system of nomenclature is based on two distinct principles—that of the design of a ship, and that of the service for which a ship is intended. *Eclaireurs d'Escadre* are classed as sloops, that being the nearest English equivalent. *Avisos* are classed as despatch vessels to distinguish them from the *Canonnières de Station*, classed as gun-vessels. The *Canonnières de Station* differ little from British sea-going gun-*boats*; they have been classed as gun-*vessels* to distinguish them from the several kinds of French gun boats.

cr., cruiser; *d.v.*, despatch vessel; *fr.c.*, frigate-built cruiser; *g.v.*, gun-vessel; *sl.*, sloop; *to.cr.*, torpedo cruiser; *to.g.b.*, torpedo gun-boat; P., deck protected throughout with thickness of plating in inches under; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Dischargers for Torpedoes.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
cr. 1st class	Alger . . . P.	4160	346 0	45 3	steel	19 6	2	8000	4 16-c.m. 5-ton B.L.R., 6 14-c.m. 3-ton do., 4 Q.F., 6 M.	4 f. tu. or l.car	1889	280,000	19·20	..	..
cr.	Aréthuse	3400	277 6	43 6	wood	21 9	1	4200	4 16-c.m. 5-ton B.L.R., 22 14-c.m. 3-ton. do., 8 M.	..	1882	..	14·00	..	..
g.v.	Aspic	480	145 4	23 10	composite	10 6	1	453	2 14-c.m. 3-ton B.L.R., 2 10-cm. 24-cwt. do.	..	1880	..	10·30	..	..
sl.	Beautemps-Beaupré . .	1350	204 8	34 2	wood	15 10	1	985	6 14-c.m. 3-ton B.L.R., 4 M. . .	..	1872	..	12·60	..	..
d.v.	Bisson	880	199 5	28 5	wood	12 8	1	849	3 14-c.m. 3-ton B.L.R., 1 10-c.m. 24-cwt. do., 5 M.	..	1874	..	11·78	..	..
to.g.b.	Bombe	320	196 10	21 7	steel	5 11	2	1800	3 3-in. Q.F., 3 M. . . .	2 f. tu. or l.car	1885	..	*18·00	..	..
sl.	Bougainville . . .	800	182 0	31 9	wood	12 9	1	449	6 12-c.m. B.L.R.	..	1859	..	9·34	..	..
d.v.	Bourayne	1290	204 8	34 4	wood	15 10	1	768	6 14-c.m. B.L.R., 2 M. . . .	..	1869	..	11·20	..	..
d.v.	Boursaint	780	198 4	28 0	wood	12 8	1	679	1 14-c.m. 3-ton B.L.R., 2 10 c.m. 3-ton do., 4 M.	..	1872	..	11·51	..	..
cr. 2nd class	Bugeaud . . . P. 2⅜″	3725	308 0	43 6	steel	20 10	2	9000	6 16-c.m. Q.F., 4 10-c.m. do., 8 47-m.m. do., 12 37-m.m. do.	6 f. tu. or l.car	Bldg.	..	19·5	..	..
g.v.	Capricorne. . . .	480	148 4	23 10	wood	10 5	1	443	2 14-c.m. 3-ton B.L.R., 2 10-c.m. 24 cwt. do.	..	1882	..	11·18	..	..

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to.g.b.	Cassini		925	262 6	27 0	steel	11 2	2	5000	1 10-c.m. Q.F., 1 6½-c.m. do., and other smaller do.	4 f. tu.	Bldg.	..	21·5	..	..
to.cr.	Catinat		450	197 0	23 0	steel	10 6	2	2200	1 6½-c.m. Q.F., 3 other Q.F., 2 M.	..	Bldg.	..	18·5	..	..
cr. 1st class	Cecille	P. 2″	5766	378 9	49 3	iron and steel	19 9	2	9600	6 16-c.m. 5 ton B.L.R., 10 14-c.m. 3-ton do., 3 Q.F., 10 M.	4 f. tu. or l.car	1888	hull, 181,666; engines, 116,000.	19·00	..	..
cr. 2nd class	Chasseloup-Laubat	P. 2⅜″	3725	308 0	43 6	steel	20 10	2	9000	6 16-c.m. Q.F., 4 10-c.m. do., 8 47-m.m. do., 12 37-m.m. do.	6 f. tu. or l.car	Bldg.	..	19·5	..	..
g.v.	Chacal		460	142 6	24 4	wood	9 5	2	251	1 14-c.m. 3-ton B.L.R., 1 10-c.m., 24 cwt. do., 2 M.	..	1868	..	9·13	..	..
cr.	Champlain		2000	258 10	35 8	wood	16 0	1	1953	10 14-c.m. 3-ton do.	..	1872	..	14·29	..	..
d.v.	Chasseur		930	199 5	28 5	wood & iron	12 7	1	850	4 14-c.m. 3-ton B.L.R. 4 M. 1 l.	..	1878	..	11·06	..	..
cr.	Château Renault		1850	262 2	35 3	wood	18 2	1	1701	7 14-c.m. 3-ton B.L.R.	..	1868	..	14·27	..	..
"	Clorinde (Requires repair)		1800	..	..	..	..	..	..	12 16-c.m. 5-ton B.L.R.	..	1857	..	10·00	..	..
cr.	Coetlogon	P. 1½″	1850	312 0	30 5	steel	14 0	2	6000	4 14-c.m. B.L.R, 3 Q.F., 4 M.	5 f. tu. or l.car	1889	134,000	19·50	200	2400
g.v.	Comète		495	151 6	24 9	composite	10 6	1	450	2 14-c.m. B.L.R., 2 10-c.m. do., 2 M.	..	1884	..	..	..	..
to.cr.	Condor		1280	216 6	29 3	steel	15 5	2	3800	5 10-c.m. 24 cwt. B.L.R., 6 M.	5 f. tu. or l.car	1885	80,000	17·70	..	..
cr.	Cosmao	P. 1½″	1877	312 0	30 5	steel	14 0	2	6000	2 14-c.m. 3-ton B.L.R., 3 Q.F., 4 M.	5 f. tu. or l.car	1888	133,000	20·50	200	2400
g.v.	Crocodile		450	141 10	24 0	composite	9 5	1	441	2 14-c.m. B.L.R.	..	1874	..	9·68	..	..
to.g.b.	Couleuvrine		320	196 10	21 7	steel	5 11	2	1800	3 3-inch Q.F., 3 M.	2 f. tu. or l.car	1885	..	18·00	..	..
"	Dague		320	196 10	21 7	steel	5 11	2	1800	3 3-inch Q.F., 3 M.	2 f. tu. or l.car	1885	..	18·00	..	..
cr.	Davout	P. 2⅜″	3027	297 6	40 0	steel	17 6	2	9000	4 16-c.m. B.L.R., 4 Q.F., 6 M.	4 f. tu. or l.car	1890	..	20·00	480	400 12½ kts.
sl.	Dayot		1350	204 8	34 4	wood	15 10	1	917	1 16-c.m. 5-ton B.L.R., 5 14-c.m. do., 2 M.	..	1869	..	11·76	..	..
cr.	Decrès (Requires repair)		1800	244 3	38 8	wood	18 2	1	1478	1 16-c.m. 5-ton B.L.R., 9 14-c.m. 3-ton do.	..	1866	..	12·04	..	..

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FRANCE.—Unarmoured Ships—*continued.*

cr., cruiser; *d.v.*, despatch vessel; *fr.c.*, frigate-built cruiser; *g.v.*, gun vessel; *sl.*, sloop; *to.cr.*, torpedo cruiser; *to.g.b.*, torpedo gun-boat; P, deck protected throughout, with thickness of plating under; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Dis-chargers for Fish Tor-pedoes.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
cr.	Desaix	1700	259 2	34 8	wood	17 7	1	1442	4 10-c.m. B.L.R., 2 M.	..	1866	..	14·21	..	..
„	D'Estaing	2400	262 5	37 5	wood & iron	18 8	1	3700	15 14-c.m. 3-ton B.L.R., 10 M.	..	1879	..	15·31	..	..
to.g.b.	Dragonne	320	196 10	21 7	steel	5 11	2	1800	3 3-inch Q.R., 3 M.	2 f. tu. or l.car	1885	..	18·00	..	..
fr.c.	Dubourdieu	3400	253 7	46 6	wood	22 10	1	3300	4 16-c.m. 5-ton B.L.R. 14 14-c.m. 3-ton B.L.R.	1 f. tu. or l.car	1884	154,553	14·00	..	..
sl.	Duchaffault	1340	204 8	34 2	wood	16 0	1	1214	6 14-c.m. 3-ton B.L.R., 2 M.	..	1872	..	12·72	..	..
„	Ducouedic	1340	204 8	34 2	wood	16 6	1	769	6 14-c.m. 3-ton B.L.R., 2 M.	..	1869	..	11·57	..	..
cr.	Duguay Trouin	3300	296 3	43 4	iron & wood	20 6	1	3740	5 19-c.m. 8-ton B.L.R., 5 14-c.m. 3-ton. do.	2 f. tu. or l.car	1877	..	15·90	430	..
g.v.	Dumont d'Urville	860	201 11	28 6	wood	13 8	1	850	4 14 c.m. 3-ton B.L.R.	..	1878	..	11·60	..	..
cr.	Du Petit Thouars	2000	257 10	35 9	wood	16 0	1	2018	10 14-c.m. 3-ton B.L.R.	..	1874	..	15·07	..	..
fr.cr.	Duquesne	5800	333 5	50 3	iron & wood	25	1	6589	7 19-c.m. 8-ton B.L.R., 14 14-c.m. 3-ton do., 8 M. 1 l.	..	1876	..	16·90	600	..
cr.	Éclaireur	1830	236 3	35 5	iron & wood	17 0	1	2050	8 14-c.m. 3-ton B.L.R., 2 M.	..	1877	..	15·00	..	..
to.cr.	Epervier P. 1½″	1280	216 6	29 3	steel	15 5	2	3200	5 10-c.m. B.L.R., 6 M.	5 f. tu. or l.car	1885	80,000	17·00	..	..

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g.v.	**Etendard**	510	142	6	24	4	wood	9	5	2	232	1 19-c.m. B.L.R., 1 12-c.m. do.	..	1868	..	9·00	..	..
g.v.	**Etoile**	450	149	3	24	7	composite	8	4	2	450	2 14-c.m. 3-ton B.L.R., 2 10-c.m. do., 2 M.	..	1885	..	10·00	..	..
cr.	**Fabert**	2100	249	4	36	0	wood	18	4	1	1107	8 14-c.m. 5-ton B.L.R.	..	1874	..	12·42	..	..
to.cr.	**Faucon** P. 1½″	1280	216	6	29	3	steel	15	5	2	3200 (forced draught)	5 10-c.m. B.L.R., 6 M.	5 f. tu. or l.car	1887	80,000	17·5	..	..
to.g.b.	**Fleche**	320	196	10	21	7	„	5	11	2	1800	3 3-inch Q.F., 3 M.	2 f. tu. or l.car	1885	..	18·00	..	..
to.cr.	**Fleureus**	1310	230	0	29	6	„	15	0	2	4000	5 10-c.m. B.L.R., 2 6½-c.m., do. 4 Q.F.	..	Bldg.	116,000	18·0	..	..
cr.	**Forbin** P. 1½″	1850	312	0	30	5	„	16	0	2	6000	2 14-c.m. 3-ton B.L.R., 3 Q.F., 4 M.	5 f. tu. or l.car	1888	..	19·50	200	2400
„	New P.	2204	..		..		..	..		..	..	4 14-c.m. Q.F., 2 10-cm. do., 8 smaller do	..	Bldg.	..	20·0	..	..
„	**Forfait**	2400	249	4	38	0	wood & iron	18	0	1	2764	15 14-c.m. 3-ton B.L.R., 2 l., 6 M.	..	1879	..	13·44	..	..
cr.	**Foudre** (torpedo depôt ship) P. 1½″	5970	370	6	51	3	steel	20	2	2	11,400	8 10-c.m. Q.F., 4 6½-c.m. do., 4 47-m.m. do.	5 f. tu.	Bldg.	..	19·00	..	..
cr.	**Friant** P. 2⅜″	3725	308	0	43	6	„	20	10	2	9,000	6 16-c.m. Q.F., 4 10-c.m. do., 8 47-m.m. do., 12 37-m.m. do.	6 f. tu. or l.car	Bldg.	..	19·5	..	..
crs.	Two new ships P.	3900	Design not yet approved.					..		..	..	.. ..	..	..	..	..	..	..
g.v.	**Fulton**	825	199	5	28	5	wood	12	8	1	850	4 14-c.m. 3-ton B.L.R.	..	1887	37,000	13·00	..	..
„	**Gabes**	490	151	6	24	9	comp.	10	6	1	450	2 14-c.m. B.L.R., 2 10-c.m. do., 2 M.	..	1884	..	11·00	..	..
sl.	**Hamelin**	1340	207	7	34	2	wood	15	10	1	1155	1 16-c.m. B.L.R., 5 14-c.m. B.L.R., 2 M.	..	1866	..	12·58	..	..
d.v.	**Hirondelle**	1040	249	6	30	4	wood	12	8	2	1780	2 10-c.m. 24-cwt. B.L.R.	..	1869	..	15·50	..	..
sl.	**Hugon**	1340	204	5	34	2	„	15	10	1	1054	6 14-c.m. 3-ton B.L.R., 2 M.	..	1872	..	11·72	..	..
d.v.	**Hussard**	880	201	10	28	6	„	13	7	1	850	4 14-c.m. 3-ton B.L.R.	..	1877	..	12·08	..	..

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FRANCE.—Unarmoured Ships—*continued.*

cr., cruiser; *d.v.*, despatch vessel; *fr.c.*, frigate-built cruiser; *g.v.*, gun vessel; *sl.*, sloop; *to.cr.*, torpedo cruiser; *to.g.b.*, torpedo gun-boat; P, deck protected throughout, with thickness of plating under; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
g.v.	Hyène	470	142 0	24 5	wood	9 5	2	258	1 14-c m. B.L.R., 1 10-c.m. do.	..	1868	..	9·06	..	..
to.g.b.	Iberville	925	262 6	27 0	steel	11 2	2	5000	1 10-c.m. Q.F., 1 6½-c.m. do., and other smaller do.	4 f. tu.	Bldg.	..	21·5	..	..
d.v.	Inconstant	825	199 5	28 5	wood	12 7	1	850	4 14-c.m. 3-ton B.L.R.	..	1886	37,000	13·00	..	..
cr.	Infernet	1931	262 2	35 9	,,	18 4	1	1815	8 14-c.m. 3-ton B.L.R.	..	1869	..	13·90	..	..
fr.c.	Iphigénie (Training ship)	3200	244 6	46 6	wood	22 4	1	2800	2 16-c.m. 5-ton B.L.R., 18 14-c.m. 3-ton do., 10 M., 3 l.	..	1881	..	14·60	..	..
cr. 1st class	Isly P.	4162	346 0	43 6	steel	19 6	2	8000	4 16-c.m. 5-ton B.L.R., 6 14-c.m. 3-ton do., 4 Q.F., 6 M.	4 f. tu. or l.car	1891	283,240	19·00	..	..
Torpedo Depôt Ship.	Japon	3970	315 0	39 0	iron	19 6	1	1500	1 14-c.m. 3-ton B.L.R., 1 10-c.m. do.	..	1859	..	12·4	..	..
cr. 1st class	Jean Bart P.	4160	346 0	43 6	steel	19 6	2	8000	4 16-c.m. 5-ton B.L.R., 6 14-c.m. 3-ton do.	4 f. tu. or l.car	1889	283,240	19·00	..	..
sl.	Kerguelen	1340	204 5	34 2	wood	15 10	1	1200	6 14-c.m. 3-ton B.L.R., 2 M.	..	1872	..	12·76	..	..
d.v.	Labourdonnais	860	199 5	28 5	,,	12 7	1	787	4 14-c.m. 3-ton B.L.R.	..	1875	..	11·69	..	..
cr.	Laclocheterie	2100	262 2	35 9	,,	18 4	1	1918	8 14-c.m. 3-ton B.L.R., 2 l.	..	1872	..	13·73	300	..

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cr.	**Lalande** . . .	P. 1½"	1877	311	6	31	2	steel	14	0	2	6000	2 14 c.m. B.L.R., 3 Q.F., 4 M. .	5 f. tu. or l.car	1888	133,800	20·50	200	2400
to.g.b.	**Lance**		320	196	10	21	7	„	5	11	2	1800	3 3-inch Q.F., 3 M. . . .	2 f. tu. or l.car	1886	..	18·00	..	..
cr.	**Lapérouse**		2400	262	5	37	5	wood & iron	18	8	1	2280	15 14-c.m. 3-ton B.L.R., 6 M., 2 l. .	..	1877	..	14·73	..	..
to.g.b.	**Lavoisier**		450	197	0	23	0	steel	10	6	2	2200	1 6½-c.m. Q.F., 3 other Q.F., 2 M. .	..	Bldg.	52,000	18·5	..	..
to.g.b.	**Leger**		444	197	0	23	0	steel	10	6	2	2100	1 6½-c.m. Q.F., 3 4·7-c.m. do., 2 M.	4 f. tu. or l.car	1891	52,000	18·5	..	..
to.g.b.	**Levrier**		444	197	0	23	0	„	10	6	2	2200	1 6½-c.m. Q.F., 3 other Q.F., 2 M. .	..	1891	52,000	18·5	..	..
sl.	**Limier**		1330	207	4	34	0	wood	15	10	1	1084	6 14-c.m. 3-ton B.L.R., 2 M. . .	..	1866	..	11·80	..	..
„	**Linois** (Requires repair) .		1210	203	5	32	2	„	15	2	1	720	6 14-c.m. 3-ton B.L.R., 2 M. . .	..	1867	..	11·50	..	..
g.v.	**Lion**		470	151	6	24	9	composite	10	6	1	400	2 14-c.m. 3-ton B.L.R., 2 10-c.m. do., 2 M.	..	1884	..	11·00	..	..
„	**Lionne**		500	141	9	23	11	„	9	6	1	426	1 14-c.m. B.L.R., 2 M., 2 l. . .	..	1877	..	9·81	..	..
„	**Lutin**		490	141	9	23	11	„	9	4	1	427	2 14-c.m. B.L.R., 2 l. . . .	..	1877	..	10·00	..	..
„	**Lynx**		485	141	9	23	11	„	9	4	1	427	2 14-c.m. B.L.R., 2 l. . . .	..	1878	..	10·38	..	..
cr.	**Magon**		2390	249	4	38	0	wood & iron	18	0	1	2462	15 14-c.m. 3-ton B.L.R., 6 M., 2 l. .	..	1881	..	14·17	..	..
g.v.	**Météore**		470	151	6	24	9	composite	10	6	1	450	2 14-c.m. B.L.R., 2 10-c.m. do., 2 M.	..	1884	..	10·00	..	..
sl.	**Milan**		1540	303	2	32	10	steel	14	7	2	4132	4 10-c.m. B.L.R., 8 M. . . .	2 f. tu. or l.car	1886	..	18·00	..	..
fr.c.	**Minerve** (Requires repair) .		2800	246	9	42	8	wood	21	4	1	1601	14 14-c.m. 3-ton B.L.R., 5 M. . .	..	1865	..	10·91	..	..
fr.c.	**Naiade**		3500	246	0	47	2	wood & iron	22	10	1	3260	2 16-c.m. 5-ton B.L.R., 18 14-c.m. 3-ton do., 4 M., 1 l.	4 f. tu. or l.car	1881	..	13·68	..	..
cr.	**Nielly**		2300	262	5	37	5	„	18	8	1	2921	15 14-c.m. 3-ton B.L.R., 10 M. .	..	1880	..	15·23	..	..
d.v.	**Papin**		825	199	6	28	6	„	13	7	1	850	4 14-c.m. 3-ton B.L.R. . . .	..	1886	37,000	13·00	..	..

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FRANCE.—Unarmoured Ships—*continued.*

cr., cruiser; *d.v.*, despatch vessel; *fr.c.*, frigate-built cruiser; *g.v.*, gun-vessel; *sl.*, sloop; *to.cr.*, torpedo cruiser; *to.g.b.*, torpedo gun-boat; P, deck protected throughout with thickness of plating under; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Dis-chargers for Tor-pedoes.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at ten knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
d.v.	Parseval	790	197 6	28 0	wood & iron	12 2	1	817	4 14-c.m. 3-ton B.L.R.	..	1879	..	12·33	..	..
cr.	Primauguet	2400	262 5	37 5	,,	18 8	1	2268	15 14-c.m. 3-ton B.L.R., 10 M.	..	1882	..	14·50	..	..
sl.	Rigault de Genouilly	1710	236 3	35 5	wood and iron topsides	17 0	1	2050	8 14-c.m. 3-ton B.L.R., 2 M.	..	1876	..	14·49	..	..
cr.	Roland	2300	249 4	38 0	,,	17 7	1	2700	15 14-c.m. 3-ton B.L.R., 6 M.	..	1882	..	14·50	..	..
g.v.	Sagittaire	490	148 4	23 10	,,	10 5	1	427	2 14-c.m. B.L.R., 2 10-c.m. do.	..	1881	..	11·05	..	..
to.g.b.	Sainte Barbe	320	196 10	21 7	steel	5 11	2	1800	3 3-inch Q.F., 3 M.	2 f. tu. or l.car	1885	..	18·00	..	..
,,	Salve	320	196 10	21 7	,,	5 11	2	1800	3 3-inch Q.F., 3 M.	2 f. tu. or l.car	1886	..	18·00	..	..
cr.	Sané	1900	255 0	36 0	wood	18 4	1	1998	6 14-c.m. 3-ton B.L.R.	..	1870	..	15·02	..	..
g.v.	Scorpion	470	151 6	24 9	composite	10 6	1	450	2 14-c.m. 3-ton B.L.R., 2 10-c.m. do.	..	1883	..	11·00	..	..
sl.	Segond	1280	204 8	34 2	wood	15 10	1	894	6 14-c.m. 3-ton B.L.R., 2 M.	..	1869	..	11·26	..	..
cr.	Seignelay	1900	255 0	36 0	,,	18 4	1	1967	8 14-c.m. 3-ton B.L.R.	..	1874	..	15·00	..	..
fr.c.	Sfax	P. 1½″ 4488	288 9	49 3	steel & wood	24 9	2	6034	6 16-c.m. 5-ton B.L.R., 10 14-c.m. 3-ton do., 3 Q.F., 5 M.	5 f. tu. or l.car	1884	200,000	16·84	800	..

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cr.	**Suchet** . . .	P. 2⅜″	3027	297	6	40	0	steel	17	6	2	9000	4 16-c.m. B.L.R., 4 Q.F., 6 M. .	4 f. tu. or l.car	Bldg.	202,760	20·00	480	4000 at 12½ kts.
„	**Surcouf** . . .	P. 1½″	1850	312	0	30	5	„	14	0	2	6000	2 14-c.m. 3-ton B.L.R., 3 Q.F., 4 M..	5 f. tu. or l.car	1888	131,200	19·50	200	2400
fr.cr.	**Tage** . . .	P. 2″	7045	390	0	53	8	„	22	10	2	10,330	6 16-c.m. 5-ton B.L.R., 10 14-c.m. 3-ton do., 3 Q.F., 12 M.	7 f. tu. or l.car	1886	..	19·00	800	..
sl.	**Talisman** (Requires repair) .		1410	224	9	33	6	wood	15	5	1	691	4 14-c.m. 3-ton B.L.R., 2 10-c.m. do., 2 M.	..	1862	..	11·28	..	..
fr.c.	**Tourville**		5600	333	5	50	3	iron & wood	25	4	1	7466	7 16-c.m. 5-ton B.L.R., 14 14-c.m. 3-ton do., 1 l.	..	1876	..	16·89	800	..
cr.	**Troude** . . .	P. 1½″	1877	311	6	31	2	steel	14	0	2	6000	2 14 c.m. 3-ton B.L.R., 7 M. . .	5 f. tu. or l.car	1888	..	19·50	200	2400
sl.	**Vaudreuil**		1280	204	8	34	1	wood	15	10	1	867	6 14-c.m. 3-ton B.L.R., 2 M. . .	..	1870	..	11·03	..	..
to.cr.	**Vautour** . . .	P. 1½″	1280	216	6	29	3	steel	15	5	2	3200	5 10-c.m. B.L.R., 6 M. . . .	5 f. tu. or l.car	1886	80,000	17·50	..	..
fr.c.	**Vénus**		2800	246	9	42	8	wood	21	4	1	1308	16 14-c.m. B.L.R., 6 M. . .	..	1864	..	12·57	..	..
cr.	**Villars**		2400	249	4	38	0	wood & iron	17	7	1	2380	15 14-c.m. 3-ton B.L.R., 6 M. .	..	1879	..	14·25	..	..
g.v.	**Vipère**		490	145	4	23	10	composite	10	6	1	427	2 14-c.m. B.L.R., 2 10-c.m. do. .	..	1881	..	10·30	..	..
sl.	**Volta** (Requires repair) .		1350	207	8	33	9	wood	15	7	1	1066	6 14-c.m. 3-ton B.L.R., 2 M. . .	..	1867	..	12·94	..	..
d.v.	**Voltigeur**		910	199	5	28	5	wood & iron	12	7	1	850	4 14-c.m. 3-ton B.L.R. . . .	..	1878	..	12·48	..	..
to.cr.	**Wattignies**. . . .		1310	233	0	29	3	steel	15	0	2	4000	5 10-c.m. B.L.R., 2 6½-c.m. Q.F., 4 3·7-c.m. do.	4 f. tu. or l.car	1891	111,000	18·0	11·6	1800 at 12½ kts.

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Besides transports, of which there is a large number, store ships, surveying vessels, training ships, yachts, sailing vessels, &c., there are, on the List of the French Navy, the following:—

River and local (screw) despatch vessels (Avisos de flotille).—Actif, Chimère, Cuvier, Élan, Ibis, Loyalty, Mouette. 240 to 410 tons; 205 to 417 I.H.P.

River and local (paddle) despatch vessels (Avisos de flotille).—Albatros, Alcyon, Alouette, Ardent, Basilic, Bengali, Brandon, Cigale, Cigogne, Écureuil, Goëland, Gogah, Héron, Jouffroy, Lézard, Magicien, Mesange, Oyap-ock, Pétrel, Pingouin, Pluvier, Salamandre, Vigilant.

River (screw) gunboats (Chaloupes canonnières).—Alerte, Arquebuse, Avalanche, Baïonette, Bouclier, Bourrasque, Carabine, Caronade, Casse-tête, Cimeterre, Épée, Escopette, Estoc, Flamberge, Framée, Glaive, Hache, Harpon, Javeline, Javelot, Massue, Mitrailleuse, Mousqueton, Mutine, Oluma (building for the Congo), Perrier, Rafale, Redoute, Revolver, Sagaie, Tirailleuse, Tromblon, Yatagan.

River (paddle) gunboats (Chaloupes canonnières). — Berthe-de-Villars, Bobillot, Chamois, Cuvellier, Doucet, Éclair, Garnier, Henry-Rivière, Jacquin, Levrard, Moulun, Pionnier, Raynaud, Rollandes, Trombe.

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Torpedo Flotilla.

French Classification.	Number of Boats.	Name of the Type.	Length.	Breadth.	Extreme Draught of Water.	Displacement.	Horse-Power.	Speed.
			ft. in	ft. in.	ft. in.	tons.		knots.
Sea-going Torpedo Boats.	3	Coureur . .	149 3	14 5	5 5	114	1600	23·5
	7	Agile . .	143 0	14 9	8 3	104	1200	20·5
	5	Avant-Garde .	137 9	13 6	6 8	120	1500	20·5 to 21·0
	5	Ouragan . .	151 0	15 9	8 6	150	1600	20·5
	Total 20							
1st-class Torpedo Boats.	9	Balny . .	131 3	12 7	7 6	77	600	19·0
	21	No. 126 . .	118 0	13 2	8 6	80	900	21·0
	Total 30							
2nd-class Boats.	18*	No. 65 . .	108 3	12 10	6 10	50	500	20·0
	15	No. 130 . .	111 6	11 6	7 0	53	600	20·0
	50	No. 99 . .	115 0	11 0	6 7	55	525	19·0
	Total 83							

* Of these nine, which were built before 1884, are much worn and of little value.

Of what the French call 3rd-class Torpedo Boats there are now 41, which for the most part could only be used for training purposes. They are from 82 to 92 ft. in length, 10 ft. 6 in. to 11 ft. in breadth, of 30 to 35 tons displacement, and speed of 16 to 18 knots.

There are 6 boats called by the French Torpedo Vedette Boats, but which are what we call 2nd-class Torpedo Boats. They are from 60 to 66½ ft. long, 7 ft. 4½ in. broad, and have a displacement of from 10 to 22 tons and a speed of 17 knots.

They have also 14 Vedette Boats, which are from 33 to 40½ ft. in length, 6½ ft. to 7 ft. 9 in. broad, draw about 4 ft. of water, and have a displacement of from 4 to 7 tons, and speed of from 9 to 13 knots.

The New Programme for 1892 includes 4 sea-going and 10 first-class Torpedo Boats.

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GERMANY.—Armoured Ships.

a.g.b., armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.b.*, central-battery ship; *t.*, turret ship; *c.d.s.*, coast defence ship; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt or Citadel.	Armour. Battery or Breastwork.	Backing. Deck Plating.	Draught of Water.	Propellers.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	ins.	ft. in.						£	knots.	tons.	knots.
br.	**Arminius** . (iron)	1583	197 4	36 0	4½	7¼ turret	9	13 10	1	1200	4 21-c.m. 10-ton B.L.R. . . .	..	1864	92,512	10·50	200	..
b.	**Baden** . . (iron)	7400	298 0	60 0	16	10 on barbette	8	19 8	2	5600	6 26-c.m. 18-ton Krupp B.L.R., 6 M., 4 l.	4 f. tu. or l. car	1880	444,886	14·00	700	..
a.g.b.	**Basilisk** . (iron)	1109	143 0	35 6	8	8 turret	8 2″	10 2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. . .	1 f. tu.	1878	58,042	9·00	40	..
b.	**Bayern** . (iron)	7400	298 0	60 0	16	10 barbette	8 2″	19 8	2	5600	6 26-c.m. 18-ton Krupp B.L.R., 6 M., 4 l.	4 f. tu. or l. car	1878	406,660	14·00	700	..
c.d.s.	**Beowulf** . (steel)	3600	240 0	49 3	9½	8 barbette	.. 2″	17 9	2	4800	3 24-c.m. 19-ton B.L.R., 6 8 7-c.m. Q.F.	4 f. tu. or l. car	1890	175,000	16·0	..	..
a.g.b.	**Biene** . . (iron)	1109	143 0	35 6	8	8 turret	8 2″	10 2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. . .	1 f. tu.	1876	62,853	9·00	40	..
b.	**Brandenburg** .	9842	354 4	64 0	15¾ to 11¾ comp.	11¾ barbette comp.	8 2½″	24 7	2	9500	6 28-c.m. B.L.R., 6 10½-c.m. Q.F., 8 8·7 c.m. do. & M.	7 f. tu. or l. car	1891	..	16·0	..	..
a.g.b.	**Camäleon** . (iron)	1109	143 0	35 6	8	8 turret	8 2″	10 2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. . .	1 f. tu.	1878	57,564	9·00	40	..
„	**Crocodil** . (iron)	1109	143 0	35 6	8	8 turret	8 2″	10 2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. . .	1 f. tu.	1879	57,237	9·00	40	..
c.b.	**Deutschland** (iron)	7676	280 0	62 4	10	8	10 2″	24 7	1	8000	8 26-c.m. 22-ton B.L.R., 1 21-c.m. 13-ton do., 7 15-c.m. 4-ton do., 6 M., 4 l.	5 f. tu. or l. car	1874	412,022	14·5	710	3400
„	**Friedrich Carl** (iron)	6007	300 0	54 6	5	4½	15	23 11	1	3500	1 21-c.m. 12-ton B.L.R., 15 21-c.m. 9-ton do., 6 M., 4 l.	4 f. tu. or l. car	1867	322,663	13·60	672	1550
t.	**Friedrich der Grosse** (iron)	6770	307 0	53 6	9¼	8 breastwork, 10 turret	8¼	24 7	1	4930	4 26-c.m. 18-ton Krupp B.L.R., 2 17-c.m. 6-ton do., 6 M., 4 l.	4 f. tu. or l. car.	1874	365,170	14·00	550	2500
c.d.s.	**Frithjof** . (steel)	3600	240 0	49 3	9½	8 barbette	.. 2″	17 9	2	4500	3 24-c.m. B.L.R., 6 8·7-c.m. Q.F.	4 f. tu. or l. car	1891	175,000	16·0	..	..
c.b.	**Hansa** (*a*) . (wood)	3610	235 2	45 0	6	6 to 4½	12½	21 8	1	2442	8 21-c.m. 9-ton B.L.R., 6 M., 4 l.	..	1872	183,270	12·00	300	..
a.g.b.	**Hummel** . (iron)	1109	143 0	35 6	8	8 turret	8 2″	10 2	1	700	1 30½-c.m. 35-ton B.L.R., 2 M. . .	1 f. tu.	1881	56,741	9·00	40	..
c.b.	**Kaiser** . (iron)	7676	280 0	62 4	10	8	10 2″	24 7	1	7803	8 26-c.m. 23-ton B.L.R., 1 21-c.m. do., 7 15-c.m. 4-ton do., 6 M., 4 l.	5 f. tu. or l. car	1874	411,301	14·60	710	3400

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br.	**König Wilhelm** (iron)	9567	355 0	60 0	8	7	10	26	7	1	8350	18 24-c.m. 14½-ton B.L.R., 5 21-c.m. 13-ton do., 6 15-c.m. 4-ton do., 6 M., 4 l.	5 f. tu. or l. car	1868	505,141	14·70	700	1740
b.	**Kurfürst Friedrich Wilhelm.**	9842	354 4	64 0	15¾ to 11¾ comp.	11¾ barbette comp.	8 2½	24	7	2	9500	6 28-c.m. B.L.R., 6 10½-c.m. Q.F., 8 8·7-c.m. do. & M.	7 f. tu. or l. car	1891	..	16·0	..	..
b.	New ship (C) (steel)	9842	354 4	64 0	15¾ to 11¾ comp.	11¾ barbette comp.	8 2½	24	7	2	9500	6 28-c.m. B.L.R., 6 10½-c.m. Q.F., 8 8·7-c.m. do. & M.	7 f. tu. or l. car	Bldg.	..	16·0	..	..
c.b.	**Kronprinz** . (iron)	5568	286 0	50 0	5	4½	16	24	3	1	4800	1 21-c.m. 12-ton B.L.R., 15 21-c.m. 9 ton do., 6 M., 4 l.	4 f. tu. or l. car	1867	314,836	14·30	650	..
a.g.b.	**Mücke** . . (iron)	1109	143 0	35 6	8	8 turret	8 2″	10	2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. . .	1 f. tu.	1877	60,960	9·00	40	..
„	**Natter** . . (iron)	1109	143 0	35 6	8	8 turret	8 2″	10	2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. . .	1 f. tu.	1880	52,822	9·00	40	..
b.	**Oldenburg** (steel)	5200	246 0	59 0	13 (compound)	8 compound	.. 1½″	19	6	2	3900	8 24-c.m. 18-ton Krupp B.L.R., 2 8¾-c.m. Q.F., 6 M., 4 l.	4 f. tu. or l. car	1884	235,342	13·5	250	..
t.	**Preussen** . (iron)	6770	308 6	53 6	9	8 breastwork 10 turret	8	24	7	1	4383	4 26-c.m. 18-ton Krupp B.L.R., 2 17-c.m. do., 6 M., 4 l.	4 f. tu. or l. car	1873	351,904	14·00	550	2500
b.	**Sachsen** . (iron)	7400	298 0	60 0	16	10 barbette	8 2″	19	8	2	5600	6 26-c.m. 18-ton Krupp B.L.R., 6 M., 4 l.	4 f. tu. or l. car	1877	422,178	14·00	700	..
a.g.b.	**Salamander** . (iron)	1109	143 0	35 6	8	8 turret	8 2″	10	2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. . .	1 f. tu.	1880	56,914	9·00	40	..
„	**Scorpion** . (iron)	1109	143 0	35 6	8	8 turret	8 2″	10	2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. . .	1 f. tu.	1877	60,796	9·00	40	..
c.d.s.	**Siegfried** . (steel)	3600	240 0	49 3	9½	8 barbette	..	17	9	2	4800	3 24-c.m. 19-ton B.L.R., 6 8¾-c.m. Q.F.	4 f. tu. or l. car	1889	175,000	16·0	..	..
„	3 not named (**R, S, T**) (steel)	3600	240 0	49 3	9½	8 barbette	.. 2″	17	9	..	4800	3 24-c.m. 19-ton B.L.R., 6 8¾-c.m. Q.F.	4 f. tu. or l. car	Bldg.	175,000	16·0	..	..
„	3 not named (**U, V, W,**) (*b*) (steel)	3600	240 0	49 3	9½	8 barbette	.. 2″	17	9	2	4800	3 24-c.m. 19-ton B.L.R., 6 8¾-c.m. Q.F.	4 f. tu. or l. car	To be built	..	..	..	..
a.g.b.	**Viper** . . (iron)	1109	143 0	35 6	8	8 turret	8 2″	10	2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. . .	1 f. tu.	1876	61,463	9·00	40	400 at 9 knots
„	**Wespe** . . (iron)	1109	143 0	35 6	8	8 turret	8 2″	10	2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. . .	1 f. tu.	1876	53,771	9·0	40	360 at 9 knots
b.	**Wissemberg** . .	9842	354 4	64 0	15¾ to 11¾	11¾ barbette	8 2½″	24	7	2	9500	6 28-c.m. B.L.R., 6 10½-c.m. Q.F., 8 8·7-c.m. do. & M.	7 f. tu. or l. car	1891	..	16·00	..	..
b.	**Wurttemberg** (iron)	7400	298 0	60 0	16	10 barbette	8 2″	19	8	2	5600	6 26-c.m. 18-ton Krupp B.L.R., 6 M., 4 l.	4 f. tu. or l. car	1878	402,512	14·00	700	..

(*a*) Not efficient without repair.

(*b*) Vote for W. was refused by Committee of Reichstag.

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GERMANY.—Unarmoured Ships.

corv., corvette; *d.v.*, despatch vessel; *fr.cr.*, frigate-built cruiser; *g.v.*, gun-vessel; *to.r.*, torpedo ram; P, deck protected throughout, with thickness of plating under; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at ten knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
g.v.	**Albatross** (Surveying ship) .	716	168 0	26 10	wood	10 6	1	496	2 15-c.m. 3½-ton B.L.R., 2 12-c.m. 27-cwt. do., 4 M.	..	1871	38,092	10·00	..	..
corv.	**Alexandrine** . . .	2373	236 3	42 7	iron, steel, and wood	18 4	1	2400	12 15-c.m. 4-ton B.L.R., 2 8·7 c.-m. 9-cwt. do., 4 M, 1 l.	1 f. tu. or l.car	1885	102,877	15·00	..	..
„	**Arcona**	2373	236 3	42 7	„	18 4	1	2400	12 15-c.m. 4-ton B.L.R., 2 8·7-c.m. 9-cwt. do., 4 M., 1 l.	1 f. tu. or l.car	1885	109,875	15·00	..	..
cr. 1st class	4 New ships . . . P. 3″	5500	387 0	49 3	steel	23 0	2	12,000	2 24 c.m. B.L.R., 8 15-c.m. Q.F. . .	6 f. tu. or l.car	Bldg.	..	20·0	..	..
cr.	New ship (E) . . P.	1880	..	..	steel	..	2	..	8 light guns	..	Bldg.	..	16·0	..	..
„	**Ariadne** (School ship) (*a*) .	1727	204 0	35 0	wood	17 4	1	2100	6 15-c.m. 3½-ton B.L.R., 2 12-c.m. 27-cwt. do., 4 M., 1 l.	..	1871	91,979	13·00	..	..
fr. cr.	**Bismarck** (*a*) . . .	2856	244 4	44 10	iron and wood	19 8	1	2529	16 15-c.m. 3½-ton B.L.R., 6 M., 2 l. .	1 f. tu. or l.car	1877	136,055	13·00	..	..
d.v.	**Blitz**	1382	246 0	32 10	steel	13 5	2	2839	1 12½-c.m. 28-cwt. B.L.R., 4 8·7-c.m. 9-cwt. do., 4 M.	1 f. tu. or l.car	1882	66,935	16·00	..	..
fr.cr.	**Blucher** (Torpedo school) .	2856	244 4	44 10	iron & wood	19 8	1	2990	16 15-c.m. B.L.R., 6 M., 2 l. .	6 f. tu. or l.car	1877	136,408	14·00	..	..
to.r.	**Bremse** . . . P. 2½″	866	203 5	27 10	steel	10 6	..	1500	1 21-c.m. 9-ton B.L.R. . . .	..	1884	49,308	15·00	65	..
cr.	**Buzzard**	1580	256 0	..	„	..	2	2800	8 10½-c.m. B.L.R., 4 M. . . .	2 l. car.	1890	..	16·0	..	..
to.r.	**Brummer** . . . P. 2½″	866	203 5	27 10	„	10 6	..	1500	1 21-c.m. 9-ton B.L.R. . . .	..	1884	52,422	15·00	65	..
corv.	**Carola**.	2169	226 4	42 7	iron and wood	18 4	1	2340	8 15-c.m. 3½-ton B.L.R., 2 8·7-c.m. 9-cwt. do., 4 M.	..	1880	109,617	14·00	..	2000
fr.cr.	**Charlotte**	3360	244 6	45 0	iron & wood	18 6	1	3000	18 15-c.m. 4-ton B.L.R., 6 M., 2 l. .	2 f. tu. or l.car	1885	..	16·00	..	..
cr.	**Eber** (New)	1600	246 0	33 6	steel & wood	15 0	2	1600	8 10½-c.m. B.L.R., 4 M. . . .	2 l. car.	Bldg.	..	16·0	..	..
„	Unnamed (New) . . .	1600	246 0	33 6	steel & wood	15 0	2	1600	8 10½-c.m. B.L.R., 4 M. . . .	2 l. car.	Bldg.	..	16·00	..	..
„	**Falke**	1600	246 0	33 6	steel & wood	15 0	2	1600	8 10½-c.m. B.L.R., 4 M. . . .	2 l. car.	1891	..	16·00	..	..
corv.	**Freya**	2017	259 2	35 0	composite	17 4	1	2471	8 15-c.m. 3½-ton B.L.R., 4 M. . .	..	1874	106,868	15·0	..	..

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cr.	Dynamite Cruiser . . .	1030	..		..		steel	..		2	..	Dynamite guns	..	Bldg.	..	22·0	..	..
corv.	**Germania (J)** . . P. 3″	4300	339	6	46	0	steel	..		2	8000	14 15-c.m. B.L.R., 8 M. . . .	f. tu. or l.car	Bldg.	220,000 without arm't	18·0	900	..
fr.cr.	**Gneisenau** (used as a training ship school)	2856	244	4	44	10	iron and wood	19	8	1	2500	16 15-c.m. 3½-ton B.L.R., 6 M., 2 l. .	1 f. tu. or l.car	1879	154,445	13·00	..	..
d.v.	**Greif**	2000	318	0	32	0	steel	13	0	2	5400	2 10½-c.m. 23-cwt. B.L.R., 10 M.. .	..	1886	..	19·00	..	..
„	**Grille**	350	170	6	24	3	wood	10	0	1	650	1 12½-c.m. 28-cwt. B.L.R., 2 8-c.m. do.	..	1857	..	13·00	..	..
g v.	**Habicht**	848	174	0	29	6	composite	11	5	1	875	1 15-c.m. 3½-ton B.L.R., 4 12-c.m. 27-cwt. do., 4 8·7-c.m. do.	..	1879	33,054	12·00	..	..
„	**Hyäne**.	489	139	8	25	1	iron	9	10	1	340	2 10½-c.m. B.L.R., 2 l. . . .	..	1878	24,340	9·00	..	..
„	**Iltis**	489	139	8	25	1	„	9	10	1	380	2 10½-c.m. B.L.R., 2 l. . . .	..	1878	27,480	9·00	..	..
cr.	**Irene** . . . . P. 3″	4300	339	6	46	0	steel	21	0	2	8000	6 15-c.m. 4-ton B.L.R., 8 15-c.m. 3½-ton do., 8 M.	4 f. tu. or l.car	1887	220,000 without arm't	18·0	900	..
d.v.	**Jagd**	1240	275	6	31	6	„	13	9	2	4000	3 10½-c.m. 23-cwt. B.L.R., 10 M.. .	..	1888	..	20·0	..	..
cr.	**Kaiser-Adler** . . .	1600	246	0	33	6	steel & wood	15	0	2	1600	8 10½-c.m. B.L.R., 4 M., 8 light guns .	2 l. car.	Bldg.	..	16·00	..	..
„	**Kaiserin Augusta (H)** P. 3″	6052	393	0	49	3	steel	23	0	3	12,000	12 long 15-c.m. B.L.R., 8 8·7-c.m. Q.F. & M.	f. tu. or l. car	1892	..	20·00	..	10,000
fr.cr.	**Leipzig**	3925	282	2	45	8	iron and wood	21	7	1	3590	2 17-c.m. 5½-ton B.L.R., 10 17-c.m. 3½-ton. 6 M., 2 l.	2 f. tu. or l. car	1875	203,055	14·00	..	4000
corv.	**Luise** (School ship) . .	1719	204	0	35	0	wood	17	4	1	2100	6 15-c.m. 3½-ton B.L.R., 2 12-c.m. 27-cwt. do., 4 M., 1 l.	..	1872	85,975	13·00	..	..
„	**Marie**	2169	226	4	42	7	iron & wood	18	4	1	2257	8 15-c.m. 3½-ton B.L.R., 2 8·7-c.m. 9-cwt. do., 4 M.	1 f. tu. or l.car	1881	..	13·50	..	2000
d.v.	**Meteor**	1020	262	6	29	6	steel	11	6	2	5000	4 8-c.m. B.L.R., 7 Q.F., 2 M. . .	..	1890	..	23·0	..	..
fr.cr.	**Moltke** (used as a training ship)	2856	244	4	44	10	„	19	8	1	2500	16 15-c.m. 3½-ton B.L.R., 6 M., 2 l. .	1 f. tu. or l.car	1877	140,705	13·50	..	..
to. g.b.	1 New ship	1080	..		..		„	..		2	..	.. .. ..	..	Bldg.	..	24·0	..	..
g.v.	**Möwe**	848	174	0	29	6	composite	11	5	1	784	1 15-c.m. 3½-ton B.L.R., 4 12-c.m. 27-cwt. do., 4 8·7-c.m. 9-cwt. do.	..	1879	33,390	12·00	..	..
„	**Nautilus** (Surveying vessel) .	716	168	0	26	10	wood	10	6	1	496	2 15-c.m. 3½-ton B.L.R., 2 12-c.m. 27-cwt. do.	..	1871	38,147	10·00	..	..
corv.	**Olga**	2169	226	4	42	7	iron & wood (sheathed)	18	4	1	2397	8 15-c.m. 3½-ton B.L.R., 2 8·7-c.m. 9-cwt. do., 4 M.	..	1880	113,812	14·00	..	2000
d.v.	**Pfeil**	1382	246	0	32	10	steel	13	5	2	2700	1 12½-c.m. 28-cwt. B.L.R., 4 8·7-c.m. 9-cwt. do., 4 M.	1 f. tu.	1882	73,605	15·00	..	..
cr.	**Prinzess Wilhelm** . P. 3″	4300	339	6	46	0	„	..		2	8000	6 15-c.m. 4-ton B.L.R., 8 15-c.m. 3½-ton do., 8 M.	4 f. tu. 1 l. car.	1887	220,000 without arm't	18·0	900	..

(*a*) Not efficient without repair.

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GERMANY.—Unarmoured Ships—*continued.*

corv., corvette; *d.v.*, despatch vessel; *fr.cr.*, frigate-built cruiser; *g.v.*, gun-vessel; *to.r.*, torpedo ram; *to.g.b.*, torpedo gunboat; P, deck protected throughout; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
fr.cr.	**Prinz Adalbert** . . .	3925	282 2	45 8	iron & wood	21 7	1	3612	2 17-c.m. 5½-ton B.L.R., 10 17-c.m. 3½-ton do., 6 M., 2 l.	..	1876	206,499	15.00	..	..
g.v.	**Schwalbe**	1300	203 0	30 6	composite	12 4	2	1500	8 10½-c.m. 22½-cwt. B.L.R. Krupp, 4 M.	..	1887	..	13·50	..	..
corv.	**Sophie**	2169	226 4	42 7	iron & wood	18 4	1	2100	8 15-c.m. 3½-ton B.L.R., 2 8·7-c.m. 9 cwt. do., 4 M.	..	1881	117,155	14·00	..	2000
g.v.	**Sperber**	1300	236 0	29 8	composite	12 6	2	1500	8 10½-c.m. 22½-cwt. B.L.R., 4 M. .	..	1888	..	13·5	..	..
fr.cr.	**Stein**	2856	244 4	44 10	"	19 8	1	2707	16 15-c.m. 3½-ton B.L.R., 2·15-c.m. Q.F., 6 M.	2 f. tu. or l.car	1879	136,069	14·00	..	..
"	**Stosch** (used as a cadet ship).	2856	244 4	44 10	"	19 8	1	2581	16 15-c.m. 3½-ton B.L.R., 6 M., 2 l. .	1 f. tu. or l.car	1877	126,066	13·00	..	..
corv.	**Victoria** (*a*) . . .	1825	235 9	35 4	wood	17 8	1	1300	4 15-c.m. 3½-ton B.L.R., 6 12-c.m. 27-cwt. do., 4 M., 1 l.	..	1864	84,450	13·00	..	..
d.v.	**Wacht**	1240	275 6	31 6	steel	13 9	2	4000	3 10½-c.m. 23 cwt. B.L.R., 10 M. .	..	1887	..	20·0	..	..
d.v.	1 New ship (G) . . .	1080	..	Improved Wacht		..	..	..	.. ..	..	Bldg.	..	24·0	..	..
g.v.	**Wolf**	489	139 8	25 1	iron	9 10	1	340	2 10½-c.m. 23-cwt. B.L.R., 2 l. . .	..	1878	24,343	9·00	..	..
d.v.	**Zieten**	975	196 10	29 6	"	11 6	1	2323	4 12-c.m. 27-cwt. B.L.R., 4 M. . .	..	1876	81,755	16·00	140	..
to. g.b.	2 Torpedo Gun Boats (1 under-water torpedo discharge)	380	..	..	steel	..	2	..	6 Q.F.	3 l. car.	1891	..	26·0	..	..
"	2 Torpedo Gunboats . .	350	213 0	..	steel	..	2	4000	6 Q.F.	3 l. car.	1890	..	26·00	..	..
"	2 Torpedo Gunboats . .	350	190 0	23 0	"	9 6	2	3600	6 M.	3 l. car.	1889	..	22·00	..	..
"	2 Torpedo Gunboats . .	350	184 0	21 8	"	9 6	2	2500	6 M.	3 l. car.	1888	..	21·0	..	..
"	2 Torpedo Gunboats . .	320	..	..	"	..	2	2000	6 M.	3 l. car.	1887	..	20·0	..	..

(*a*) Not efficient without repair.

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There are, also, on the German list, besides stationary harbour vessels and yachts, the following :—

One steam gunnery ship.—Mars of 3333 tons displacement, and 2000 I.HP.

Two steam gunnery tenders.

One steam torpedo tender (Ulan).

One steam gunboat (Dracke).

One steam training ship—Nixe.

Eight small torpedo vessels; 50 to 140 tons, 500 to 550 I.HP.

Torpedo Boats.

Ninety-five first-class, of 75 to 103 tons and 19 to 22 knots speed, armament, 2 launching tubes; 2 machine guns, 13 second-class boats. Six second-class, of 50 tons displacement and two torpedo boats (wood).

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Merchant Cruisers (Auxiliaries to the German Navy).

To what Company belonging.	Name of Ship.	Length.	Breadth.	Draught of Water.	Displacement.	Indicated H.P.	Speed.	When Built.	Armament of each Ship.
		ft. in.	ft. in.	ft. in.	tons.		knots.		
Hamburg-American S.S. Co.	Fürst Bismark . . .	502 0	50 10	23 3	10,500	16,400	20·7	1891	8 15-c.m. B.L.R., 4 12½-c.m. do., 2 8·8-c.m. Q.F., 2 5·7-c.m. do., 14 M.
	Normannia . . .	498 9	57 6	22 3	10,500	16,250	20·0	1890	.. ..
	Columbia	462 6	56 0	19 8	9,500	13,680	20·0	1889	.. ..
	Augusta Victoria . .	459 3	56 0	23 0	9,500	12,280	20·0	1889	.. ..
North German Lloyds	Spree	462 6	51 10	22 0	8,900	12,770	20·0	1890	.. ..
	Havel	462 6	51 10	22 3	8,900	12,770	20·0	1890	.. ..
	Lahn	449 6	49 0	22 0	7,700	9,500	19·5	1887	.. ..

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GREECE.—Armoured Ships.

t., turret ship; *c.b.*, central-battery ship; *br.*, broadside ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour.		Backing.	Mean Draught of Water.	Propeller.	Indicated Horse power.	Armament.		Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
					Belt.	Battery.	Deck Plating.				Guns.	Fish Torpedo Dis-chargers					
		tons.	ft. in.	ft. in.	inches.	inches.	ins.	ft. in.						£	knots.	tons.	
b.	**Hydra** . (steel)	4885	320 0	51 10	11¾ 3″ above water	13¾ & 11¾	.. 2″	18 0	2	7000	3 27-c.m. B.L.R., 4 15-c.m. do., 7 6-pdr. Q.F., 16 M., 2 l.	3 f. tu. or l. car	1889	..	17·00	..	..
c.b.	**King George** (iron)	1774	200 2	32 10	7	6	9	15 6	2	2400	2 21-c.m. 10-ton B.L.R. (Krupp), 2 M., 4 l.	..	1867	..	12·00	210	..
br.	**Olga** (wood)	2060	230 0	59 0	4¾	4	..	18 0	1	1950	4 17-c.m. 5½-ton B.L.R. (long Krupp), 2 17-c.m. 3½-ton do. (short), 4 M., 4 l.	..	1869	..	10·00	240	..
b.	**Psara** . .	4885	320 0	51 10	11¾ 3″ above water	13¾ & 11¾	.. 2″	18 0	2	7000	3 27-c.m. B.L.R., 4 15-c.m. do., 7 6 pdr. Q.F., 16 M., 2 l.	3 f. tu. or l. car	1890	..	17·0	..	..
b.	**Spetsia** . .	4885	320 0	51 10	11¾ 3″ above water	13¾ & 11¾	.. 2″	18 0	2	7000	3 27-c.m. B.L.R., 4 15-c.m. do., 7 6-pdr. Q.F., 16 M., 2 l.	3 f. tu. or l. car	1889	..	17·0	..	..

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GREECE.—Unarmoured Ships.

cr., cruiser; *corv.*, corvette; *fr.cr.*, frigate-built cruiser; *g.v.*, gun-vessel; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	
g.v.	**Acheloos**	420	138 0	24 11	steel	11 6	1	400	2 9·6-c.m. B.L.R. (Krupp), 3 M.	..	1884	..	10·00	50	..
corv.	**Admiral Miaulis**	1800	246 0	36 0	iron and wood	14 5	1	2200	3 17-c.m. B.L.R. 5½-ton (long Krupp), 1 17-c.m. 3½-ton do. (short), 2 M., 4 l.	..	1879	..	15·00	220	..
g.v.	**Alpheos**	420	138 0	24 11	steel	11 6	1	400	2 9·6-c.m. B.L.R. (Krupp), 3 M.	..	1884	..	10·00	50	..
g.v.	**Aphroessa**	380	124 7	22 11	iron	9 10	1	160	1 8·7-c.m. B.L.R. (Krupp)	..	1858	..	9·00	30	..
g.v.	**Eurotas**	420	138 0	24 11	steel	11 6	1	400	2 9·6-c.m. B.L.R. (Krupp), 3 M.	..	1884	..	10·00	50	..
fr.cr.	**Hellas**	1300	200 2	37 0	wood	19 4	1	1500	12 15-c.m. B.L.R. (Krupp), 2 M.	..	1878 (repaired)	..	11·00	230	..
cr.	**Mecali** (was Buzzard)	1000	210 6	32 6	steel	..	2	1000	2 M.	..	1880	..	..	..	..
g.v.	**Nauplion**	380	124 7	22 11	iron	9 10	1	160	1 8·7-c.m. B.L.R. (Krupp)	..	1856	..	9·00	30	..
g.v.	**Paralos**	380	123 0	23 11	„	9 10	1	204	1 8·7-c.m. B.L.R. (Krupp), 1 M.	..	1858	..	8·00	60	..
g.v.	**Peneus**	420	138 0	24 11	steel	12 6	1	400	2 9·6-c.m. B.L.R. (Krupp), 3 M.	..	1884	..	10·55	50	..
g.v.	**Plixavra**	380	124 7	22 11	iron	9 10	1	160	1 8·7-c.m. B.L.R. (Krupp)	..	1856	..	9·00	55	..
g.v.	**Salamina**	380	123 0	23 11	„	9 10	1	200	1 8·7-c.m. B.L.R. (Krupp), 1 M.	..	1858	..	8·00	60	..
corv.	**Sfaktirea** (was Eldorado)	1000	235 0	30 0	steel	13 0	1	1700	2 10-c.m. B.L.R. (Krupp), 2 M.	..	1885	..	14·50	100	..
g.v.	**Syros**	380	124 7	22 11	iron	9 10	1	160	1 8·7-c.m. B.L.R. (Krupp)	..	..	..	9·00	18	..

Torpedo depôt-ship.—Psara, 1100 tons, 500 IH.P., 2 10-c.m. B.L.R. (Krupp) guns, 2 Whitehead torpedo-launching guns, one port on each broadside, 2 under-water torpedo tubes ahead. 14 knots speed.

Torpedo-boats.—31 of several classes, 6 being sea-going, of 128 ft. long, 15 ft. 3 in. broad, of 85 tons displacement, 1000 horse-power, and 19 knots speed, built at Stettin; and 6 other first class boats, built by Yarrow, of about 100 ft. in length, of 46 tons displacement, 620 horse-power and 20 knots speed; 19 of 21 to 35 tons displacement, and 20 smaller steam-boats for torpedo purposes.

There are also 2 gunboats of the Lambda (China) class, Ambrakia was Hydra and Actæon was Spetsia, of 440 tons displacement, 380 horse-power, 10 knot speed, fitted with 1 26-c.m. Krupp gun and 2 machine guns; four small iron steamers fitted for spar torpedoes; and five small composite custom-house steamers; also a paddle yacht and a screw transport—the Bosbulina—of 1170 tons displacement, and 1800 horse-power.

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HAYTI.

(The Republic of Hayti has unarmoured ships only.) *corv.*, corvette; *g.v.*, gun-vessel; *sl.*, sloop.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean draught of water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
g.v.	**22nd December** .	900	208 0	29 11	iron	16 0	1	360	4 40-pdr. (Armstrong)	..	1860	..	9·00	..	..
corv.	**Dessalines** . .	..	185 0	32 0	„	14 9	1	190 (nominal)	1 7-in., 2 30-pdr., 4 34-pdr. . . .	..	1883	..	16·00	..	..
sl.	**St. Michael** . .	850	162 0	33 0	„	11 0	1	120 (nominal)	1 11-in. smoothbore, 8 30-pdr. . .	..	1875	..	12·00	..	..
„	**1804** . . .	600	145 0	29 0	„	10 0	1	100 (nominal)	1 10-in. smoothbore, 6 30-pdr. . .	..	1875	..	12·00	..	..
„	**Toussaint L'ouverture**	500	164 0	24 6	steel	9 6	1	800	1 6¼-in. B.L.R., 2 4¾-in. do., 2 M. . .	..	1886	..	12·00	120	3000

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ITALY.—Armoured Ships.

a.g.b., armoured gunboat; *b.*, barbette ship; *c.b.*, central-battery ship; *t.*, turret ship; *c.d.*, coast-defence ship; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Citadel or Turret.	Backing. Deck Plating.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Whitehead Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	ins.	ft. in.						£	knots.	tons.	knots.
t.	**Affondatore** . .(iron)	4376	290 0	40 0	5	5 turret	9 2″	20 0	1	3240	2 25-c.m. 28-ton B.L.R. (Armstrong), 6 12-c.m. Q.F., 6 M.	4 l. car.	1865	152,480	12·00	460	1647
c.b.	**Ancona** . . .(iron)	4250	256 0	50 0	4½	4½	13¾	25 0	1	2548	6 15-c.m. B.L.R., 6 12-c.m. Q.F., 6 M. .	2 l. car.	1864	172,000	12·0	485	2000
b.	**Andrea Doria** (steel)	11,000	328 2	65 4	18 comp.	18 comp.	.. 3″	27 2	2	10,500	4 43-c.m. 105-ton B.L.R. (Armstrong), 2 15-c.m. do., 4 12-c.m. Q.F., 12 M.	5 f. tu. or l. car (2 sub)	1885	..	16·10	850	4500
c.b.	**Castelfidardo** .(iron)	4250	256 0	50 0	4½	4½	13¾	21 11	1	2125	6 15-c.m. B.L.R., 6 12-c.m. Q.F., 6 M.	2 l. car.	1863	..	12·00	485	2600
t.	**Dandolo** (iron and steel)	11,202	340 11	64 9	21½	18 turret	22¾ 2″	26 7	2	7500	4 45-c.m. 100-ton M.L.R. (Armstrong), 3 12-c.m. Q.F., 12 M., 2 l.	3 f. tu. or l. car	1878	700,000	15·60	1000	3760
„	**Duilio** . (iron and steel)	11,138	340 11	64 9	21½	18 turret	22¾ 2″	26 7	2	7500	4 45-c.m. 100-ton M.L.R. (Armstrong), 3 12-c.m. Q.F., 12 M., 2 l.	3 f. tu. or l. car	1876	..	15·00	1000	3760
c.b.	**Formidabile** (School Ship) .(iron)	2725	216 0	45 10	4½	4½ battery	9	18 0	1	1100	4 20-c.m. 7-ton M.L.R. (Armstrong), 2 15-c.m. B.L.R., 5 12-c.m. do., 4 M.	..	1861	118,000	11·00	310	..
b.	**Francesco Morosini** (steel)	11,000	328 2	65 4	18 comp.	18 comp.	.. 3″	27 2	2	10,000	4 43-c.m. 105-ton B.L.R. (Armstrong), 2 15-c.m. do., 4 12-c.m. Q.F., 10 M.	5 f. tu. or l. car (2 sub)	1885	..	16·00	850	4500
„	**Italia** . . (steel)	15,900	400 6	74 0	16-inch funnel op'nings comp.	19 comp.	22¾ 3″	31 2	2	18,000	4 43-c.m. 100-ton B.L.R. (Armstrong), 8 15-c.m. 4-ton do., 4 12-c.m. Q.F., 12 57-m.m. do., 36 M.	4 f. tu. or l. car	1880	..	18·00	1650	6000
b.	**Lepanto** . (steel)	15,900	400 6	74 0	16-inch funnel op'nings	19 comp.	22¾ 3″	31 2	2	18,000	4 43-c.m. 100-ton B.L.R. (Armstrong), 8 15-c.m. 4-ton do., 4 12-c.m. Q.F., 12 57-m.m. do., 36 M.	4 f. tu. or l. car	1883	..	18·38	1650	6000

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c.b.	**Maria Pia** . .	(iron)	4268	256	0	49	4	4½	4½	13¾	22	7	1	2924	8 15-c.m. B.L.R., 6 12-c.m. Q.F., 6 M.	2 f. tu. or l.car	1863	..	12·00	485	2600
c.d. 2 batteries	**Palestro** .	(wood)	6419	265	0	57	10	8¾	6	24	26	11	1	3496	1 28-c.m. 25-ton M.L.R. (Armstrong), 6 25-c.m. 18-ton do., 6 M., 6 l.	2 f. tu. or l.car	1873	..	13·00	513	1780
c.d., *c.b.*	**Principe Amedeo**	(wood)	5814	265	0	57	9	8¾	6	24	26	6	1	3413	1 28-c.m. 25-ton M.L.R. (Armstrong), 6 25-c.m. 18-ton do., 6 M., 6 l.	2 f. tu. or l.car	1872	..	13·00	513	1780
b.	**Re Umberto**	(steel)	13,251	400	0	76	9	4 steel on side	18 barbettes	.. 3″	28	6	2	19,500	4 34-c.m. 67-ton B.L.R. (Armstrong), 8 15-c.m. do., 16 12-c.m. Q.F., 10 5·7-c.m. do., 17 3·7-c.m. do., 2 M., 2 l.	8 f. tu. or l.car	1888	1,000,000	18·00	1200	..
c.d., *c.b.*	**Roma** . .	(wood)	5814	262	6	58	6	4½	4½ battery	26	25	3	1	3000	9 22-c.m. 13-ton M.L.R., (Armstrong), 6 M., 6 l.	2 l. car.	1865	..	13·00	511	1940
b.	**Ruggiero di Lauria** .	(steel)	11,000	328	2	65	4	18 comp.	18 comp. barbettes	.. 3″	27	2	2	10,000	4 43-c.m. 105-ton B.L.R. (Armstrong), 2 15-c.m. do., 4 12-c.m. Q.F., 12 M.	5 f. tu. or l.car (2 sub)	1884	..	17·0	850	4500
c.b.	**San Martino** .	(iron)	4268	256	0	49	4	4½	4½	14	22	7	1	2620	8 15-c.m. B.L.R., 6 12-c.m. Q.F., 6 M. .	2 f. tu. or l.car	1863	..	12·00	490	..
b.	**Sardegna** .	(steel)	13,251	400	0	76	9	4 steel on side	14¼ comp. barbettes	.. 3″	28	6	2	22,800	4 34-c.m. 67-ton B.L.R. (Armstrong), 8 15-c.m. do., 16 4·7-in. Q.F., 2 7½-c.m. do., 10 5·7-c.m. do., 17 3·7-c.m. do., 2 M.	5 f. tu. or l.car	1890	1,000,000	19·00	1200	..
„	**Sicilia** . .	(steel)	13,298	400	0	76	9	4 steel on side	18 comp. barbettes	.. 3″	28	6	2	19,500	4 34-c.m. 67-ton B.L.R. (Armstrong), 8 15-c.m. do., 16 12-c.m. Q.F., 10 5·7-c.m. do., 17 3·7-c.m. do., 2 M., 2 l.	5 f. tu. or l.car	1891	1,000,000	18·00	1200	..
„	C—New ship (not named). (Similar to the Sicilia).		13,298	..	..	..		..	..	..	..	..		..	..	..	Bldg.	..	..	..	..
a.c.	Two armoured cruisers (new)		7,000	Design not approved.				..	..	..	..	..		..	..	..	New Programme.	..	..	..	..
c.b.	**Terribile** . (School Ship).	(iron)	2725	210	0	45	11	4½	4½ battery	9	18	0	1	1100	8 20-c.m. 7-ton M.L.R. (Armstrong), 4 M., 6 l.	..	1861	112,454	11·00	310	..
„	**Varese** . .	(iron)	2220	200	0	42	7	4½	4½ battery	9	15	9	2	977	4 20-c.m. 7-ton M.L.R., 1 16-c.m. do., 4 M., 6 l.	..	1863	85,000	10·00	180	..

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ITALY.—Unarmoured Ships.

cr., cruiser; *corv.*, corvette; *d.v.*, despatch vessel; *g.v.*, gun-vessel; *to.g.b.*, torpedo gunboat; *to.cr.*, torpedo cruiser; P, deck protected throughout, with thickness of plating, in inches, under; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armaments. Guns.	Armaments. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
d.v.	**Agostino Barbarigo** .	656	216 6	23 11	steel	10 10	1	1700	5 57-m.m. Q.F., 2 M.	..	1879	..	15·50	210	1000
cr.	**Amerigo Vespucci** . P. 1½″	2533	255 11	42 7	„	17 0	1	5000	8 15-c.m. 4-ton B.L.R., 6 M., 2 l. . .	2 l. car.	1882	..	15·00	500	..
g.v.	**Andrea Provana** . .	649	167 4	26 3	„	10 2	1	1000	4 12-c.m. B.L.R., 2 M.. . . .	..	1884	..	13·00	120	..
d.v.	**Archimede** . . .	770	230 0	26 3	„	10 0	1	1700	4 12-c.m. B.L.R., 4 M. . . .	2 l. car	1887	..	16·00	210	..
to.g.b.	**Aretusa**	740	230 0	25 6	„	11 9	3	4200	1 12-c.m. B.L.R., 6 6-pdr. and 3 3-pdr. Q.F., 3 M.	5 f. tu. or l.car	1891	..	20	180	..
cr.	**Calabria** . . . P.	2470	262 6	39 6	„	16 7	2	6500	4 15-c.m. Q.F., 6 12-c.m. do., 8 5·7-c.m. do.	4 f. tu. or l.car	Bldg.	..	19·00	..	..
corv.	**Caracciolo** (Training ship) .	1650	209 11	36 0	wood	16 5	1	973	6 16-c.m. 5-ton M.L.R., 4 M. . .	..	1869	..	10·00	180	..
g.v.	**Cariddi**	1050	177 2	28 6	„	12 5	1	956	2 12-c.m. B.L.R., 1 16-c.m. do., 4 M. .	..	1875	..	10·00	164	..
„	**Castore**	530	116 0	36 0	steel	9 6	1	..	1 40-c.m. 120-ton Krupp . . .	..	1889	..	8·00	..	..
to.g.b.	**Clio** . . . . P. 1″	840	246 0	25 6	„	11 9	3	4200	6 6-pdr. and 2 3-pdr. Q.F., 3 M. . .	5 l. car	Bldg.	..	20·00	180	..
to.g.b.	**Confienza** . . .	740	230 0	25 6	steel	9 0	3	2400	1 12 c.m. B.L.R., 6 6-pdr., and 2 3-pr. Q.F.G., 3 M.	2 f. tu. or l.car	1887	..	15·0	180	..
corv.	**Cristoforo Colombo** . .	2362	249 4	36 0	wood	17 4	1	3782	6 12-c.m. B.L.R., 4 M., 2 l. . . .	..	1875	..	14·00	471	3600
g.v.	**Curtatone**	1040	177 3	32 8	steel	13 6	1	1100	4 12-c.m. Q.F., 6 M.	..	1887	..	12·00	197	..

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cr.	**Dogali** . . .	P. 2½″–1″	2020	250	0	37	0	steel	14	6	2	7600	6 6-inch B.L.R. (Armstrong), 9 Q.F., 6 M.	4 l. car	1887	170,000	19·66	480	..
cr.	**Elba**	P. 2″–1″	2730	262	6	39	6	„	16	7	2	6500	4 15-c.m. Q.F., 6 12-c.m. do., 8 5·7-c.m. do.	..	Bldg.	..	19·0	..	..
cr.	**Etna** . . .	P. 1½″	3530	282	2	42	7	steel	19	0	2	6000	2 25-c.m. 28-ton B.L.R. (Armstrong), 6 15-c.m. 4-ton do., 5 5·7-c.m. Q.F., 10 M.	3 f. tu. or l.car	1885	64,000 (engines)	17·00	630	..
cr.	Three new ships, Etna class	P. 1½″	..	..		..		„	..	..	..	..	.. .. ..	4 l. car.	To be laid down	..	..	..	..
to.g.b.	**Euridice** . . .	P. 1″	840	229	6	26	9	steel	10	2	2	4000	1 12-c.m. B.L.R., 6 6-pdr. Q.F., 3 3-pdr. do., 2 M.	6 f. tu. or l.car	1892	..	21·0	120	..
cr.	**Etruria** . . .	P. 2″–1″	2280	262	6	39	6	„	16	7	2	6500	4 15-c.m. Q.F., 6 12-c.m. do., 8 5·7-c.m. do.	4 l. car.	1891	..	18·50	400	..
d.v.	**Faadi Bruno** (*a*) .	P. 1″	840	137	6	32	9	„	..		1	800	.. .. ..	..	Bldg.	..	20·0	..	..
cr.	**Fieramosca** . .	P. 1½″	3745	290	0	43	6	„	19	4	2	7700	2 25-c.m. 25-ton B.L.R., 6 6-inch Q.F.	4 f. tu. or l.car	1888	..	17·00	590	..
corv.	**Flavio Gioja** . .	P. 1½″	2533	255	11	42	7	„	17	0	1	5000	8 15-c.m. 4-ton B.L.R. (Armstrong), 6 M.	3 f. tu. or l. car	1881	..	15·00	500	..
to.g.b.	**Folgore**		317	187	0	19	8	„	6	7	2	2400	2 6-pr. and 2 3-pr. Q.F., 1 M. . .	4 l. car. or f. tu.	1886	..	20·00	60	..
d.v.	**Galileo**		770	230	0	26	3	„	8	2	1	1700	4 12-c.m. B.L.R., 4 M.. . . .	2 l. car	1887	..	15·00	210	..
cr.	**Giovanni Bausan** .	P. 1½″	3068	275	7	42	7	steel	18	4	2	6500	2 25-c.m. 24-ton B.L.R. (Armstrong), 6 15-c.m. 5-ton B.L.R., 4 57-mm. Q.F.	3 f. tu. or l.car (1 f. tu. sub.)	1883	160,000	17·00	600	5000
to.g.b.	**Goito**		740	230	0	25	6	„	11	9	2	3600	4 6-pr. and 2 3-pr. Q.F., 3 M. . .	6 f. tu. or l.car	1887	..	19·00	180	..
g.v.	**Governalo**		1040	177	3	32	10	„	14	4	1	1100	6 12-c.m. Q.F., 4 M.	..	1891	..	13·0 (*b*)	..	..
to.g.b.	**Iride**	P. 1″	840	229	6	26	9	„	10	2	2	4000	1 12-c.m. B.L.R., 6 6-pdr. Q.F., 3 3-pdr. do.	6 l. car.	1891	..	21·00	120	..
cr.	**Liguria** . . .	P. 2″–1″	2280	262	6	39	6	„	16	7	2	6500	4 15-c.m. Q.F., 6 12-c.m. do., 8 5·7-c.m. do.	..	Bldg.	..	19·00	..	..
„	**Lombardia** . .	P. 2″–1″	2470	262	6	39	6	„	16	7	2	6500	4 15-c.m. Q.F., 6 12-c.m. do., 8 5·7-c.m. do.	4 l. car.	1890	..	19·00	..	..

(*a*) The particulars of this vessel cannot be verified.

(*b*) 19·6 knots on her trials.

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ITALY.—Unarmoured Ships.—*continued.*

cr., cruiser; *corr.*, corvette; *d.v.*, despatch vessel; *g.v.*, gun-vessel; *to.g.b.*, torpedo gunboat; *to.s.*, torpedo ship; P., deck protected throughout, with thickness of plating under; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armaments. Guns.	Armaments. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
d.v.	**Marcantonio Colonna**	656	216 6	23 11	steel	10 10	1	1700	5 57-m m. Q.F., 2 M.	..	1879	..	15·40	197	..
cr.	**Marco Polo** P. 4″	4580	283 0	43 0	„	19 0	2	7700	6 15-c.m. Q.F., 10 12-c.m. do.	..	Bldg.	..	17·00	..	..
to.g.b.	**Minerva**	740	230 0	25 6	„	11 9	3	4200	1 12-c.m. B.L.R., 6 6-pdr. and 2 3-pdr. Q.F., 3 M.	5 f. tu. or l.car	Bldg.	..	20·00	180	..
„	**Montebello**	740	230 0	25 6	„	11 9	3	3600	1 12-c.m. B.L.R., 6 6-pdr. and 2 3-pdr. Q.F., 3 M.	5 f. tu. or l.car	1888	..	19·00	180	..
„	**Monzambano**	740	230 0	25 6	„	11 9	3	4200	6 6-pr. Q.F.G., 2 3-pr. do., 3 M.	5 f. tu. or l.car	1888	..	20·00	180	..
„	**Partenope** P. 1″	840	246 0	25 6	„	11 9	3	4200	1 12-c.m. B.L.R., 6 6-pdr. and 2 3-pdr. Q.F., 3 M.	5 f. tu. or l.car	1889	..	20·00	180	..
cr.	**Piemonte** P. 3″–1″	2500	300 0	38 0	„	15 0	2	12,000	6 6-inch Q.F., 6 4¾-inch do., 10 6-pdr. do., 10 M. (4 being Maxims)	3 f. tu.	1888	..	21·00	600	13,000
to.s.	**Pietro Micca** (Harbour service)	535	203 5	19 7	iron	10 6	1	972	2 M.	1 l. car.	1876	..	10·00	28	..
g.v.	**Poluce**	530	116 0	36 0	„	9 6	1	..	1 40-c.m. 120-ton Krupp	..	1889	..	8·0	..	..
d.v.	**Rapido**	1568	262 5	30 6	„	12 6	1	1920	5 57-m.m. Q.F., 2 M.	..	1876	..	13·40	300	2560
to.g.b.	**Saetta**	317	187 0	19 8	steel	6 7	1	2400	2 6-pr. Q.F., 2 3-pr. do., 2 M.	4 f. tu. or l.car	1887	..	20·00	90	..

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cr.	**Savoia** (used as the Royal Yacht)	P. 1½″	2850	275	6	42	7	steel	17	0	1	5000	6 6-pr. Q.F., 4 M.	..	1883	..	15·00	500	..
g.v.	**Scilla**		1050	177	2	28	6	wood	12	5	1	826	2 12-c.m. B.L.R. (Armstrong), 1 16-c.m., 4 M.	..	1874	..	10·00	..	..
„	**Sebastiano Veniero**		649	167	4	26	3	steel	10	2	1	1000	4 12-c.m. B.L.R., 2 M.	..	1884	..	13·00	..	..
d.v.	**Staffetta**		1505	252	7	30	10	iron	13	2	1	1800	4 12-c.m. B.L.R., 2 M.	1 l. car.	1876	..	13·50	300	3300
cr.	**Stromboli**	P. 1½″	3530	282	2	42	7	steel	19	0	2	7700	2 25-c.m. 28-ton B.L.R. (Armstrong), 6 15-c.m. 4-ton do., 15 M.	4 f. tu. or l.car	1886	64,000 (Engines)	17·00	630	..
to.g.b.	**Tersicore**	P. 1″	840	246	0	25	6	„	11	9	3	4200	1 12-c.m. B.L.R., 6 6-pdr. Q.F., 2 3-pdr. do., 3 M.	..	1892	..	20·0	180	..
to.g.b.	**Tripoli**		740	230	0	25	10	steel	11	9	2	2573	4 6-pr. and 2 3-pr. Q.F., 3 M.	5 f. tu. or l.car	1886	..	19·00	180	..
cr.	**Umbria**	P. 2″–1″	2280	262	6	39	6	„	16	7	2	6500	4 15-c.m. Q.F., 6 12-c.m. do.	4 l. car.	1891	..	19·00 (*a*)	..	..
to.g.b.	**Urania**	P. 1½″	846	230	0	25	6	„	11	2	2	4200	1 6-in. B.L.R., 4 3-in. Q.F., 3 M.	6 f. tu. or l.car	1891	60,000	22·00	180	..
„	Four new ships	„	846	230	0	25	6	„	11	2	2	4200	1 6-in. B.L.R., 4 3-in. Q.F., 3 M.	6 f. tu. or l.car	Bldg.	60,000 each	22·00	180	..
d.v.	**Vedetta**		827	183	9	26	11	iron	11	5	1	670	4 12-c.m. B.L.R., 4 M.	..	1866	..	11·00	137	..
g.v.	**Veniero**		649	170	0	26	3	steel	10	6	..	1068	4 12-c.m. B.L.R., 2 M.	..	1884	..	13·00	..	..
cr.	**Vesuvio**	P. 1½″	3530	282	2	42	7	„	19	0	2	7700	2 25-c.m. 28-ton B.L.R., 6 15-c.m. 4-ton do., 5 57-m.m. Q.F., 10 M.	3 f. tu. or l.car	1886	64,000 (Engines)	17·00	590	..
cr.	**Vettor Pisani** (Training ship)		1800	213	3	39	4	wood	17	0	1	1004	6 12-c.m. B.L.R., 4 M.	..	1869	..	9·00	190	..
g.v.	**Volturno**		1040	177	3	32	8	steel	14	4	1	1100	6 5-inch B.L.R., 4 M.	..	1887	..	12·00	197	..

(*a*) 19·6 knots on her trials.

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Besides the ships of which the names are given in the foregoing tables, Italy has

Gunboats (*Staunch class*).—Guardiano and Sentinella, of 265 tons, and of 231 and 260 I.HP. respectively; 6 small gunboats of 87 tons and 52 HP.

Paddle despatch vessel.—Messaggiero, of 1020 tons and 15 knots speed.

Also transports, one being the Eritreo (late America), of 9550 tons displacement, and 18 knots speed; torpedo depôt ship Vulcano; training ships, Maria Adelaide, of 3429 tons, the Venezia of 5000 tons, and the Vittoria Emanuele of 3126 tons, harbour and coasting-service craft, &c.

Torpedo-boats.—First class, 100 built and building; of these five of the Nibbio class are 152½ ft. long, 16 ft. 9 inches wide, about 140 tons displacement, and 23 knots speed; nine are 135 ft. long, 14 ft. wide, displacement 110 tons, and 22·5 knots speed; 84 of 100 to 130 ft. long, and of 85 tons to 32 tons displacement, and 20 to 22½ knots speed; and the two others from 80 to 100 ft. long, of 32 tons displacement, and 21 knots speed. Second class 22, all built of steel, displacement 13 to 31 tons, and with speeds from 16 to 21 knots.

Torpedo-boats, wood. There are twelve of from 40 to 60 ft. long, of 8 to 14 tons displacement, and 10 to 14 knots speed.

The new Programme provides for building ten sea-going torpedo-boats.

There are eight merchant steamers of more than 3000 tons on the auxiliary list. Of these, three are fitted for two torpedo-launching apparatus, and all of them with 2 12-c.m. Q.F., 4 3-pdr. do., and 7 M. guns.

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JAPAN.—Armoured Ships.

a.c., armoured cruiser; *a.g.b.*, armoured gunboat; *br.*, broadside ship; *c.b.*, central-battery ship; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Battery.	Backing. Deck Plating.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
c.b.	**Fu-Soo** . . . (iron)	3718	220 0	48 0	7	9	..	18 4	2	3500	4 24-c.m. 15-ton B.L.R. (Krupp), 2 17-c.m. 6-ton do., 4 l., 5 M.	..	1877	..	13·2	360	4500
a.c.	**Hi-yei** *. . (composite)	2200	231 0	40 9	4½	..	..	17 4	1	2490	3 17-c.m. 3½-ton B.L.R. (Krupp), 6 15-c.m. do.	..	1878	..	13·00	280	..
„	**Kin-go** * . (composite)	2200	231 0	40 9	4½	..	..	17 4	1	2450	3 17-c.m. 3½-ton B.L.R. (Krupp), 6 15-c.m. do.	..	1877	..	13·70	280	..
br.	**Rio-jo** . . (composite)	1459	213 3	34 5	4½	4	..	17 4	1	975	2 17-c.m. 6-ton B.L.R. (Krupp), 6 70-pdr. (Vavasseur), 2 l.	..	1864	..	9·00	350	..
a.g.b.	**Tisima**	1480	..	..	..	..	..	..	..	..	.. .. ..	..	1888	..	..	..	..
a.c.	**Tschiyoda** . . (steel)	2450	308 0	42 6	4½	..	.. 1″	14 0	2	5600	10 12-c.m. Q.F., 14 4·7-c.m. do., 3 M.	3 l. car.	1889	..	19·0	240	..

* These are not armoured ships in the usual sense of the term. There is no armour as against end-on fire, and no armoured deck.

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JAPAN.—Unarmoured Ships.

corv., corvette; *cr.*, cruiser; *c.d.s.*, coast defence ships; *d.v.*, despatch vessel; *g.v.*, gun-vessel; *to.g.b.*, torpedo gunboat; P., deck protected throughout, with thickness of plating under; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.							knots.	tons.	knots.
g.v.	**Akagi**	615	164 0	27 0	steel	10 0	..	700	1 24-c.m. B.L.R (Krupp), 1 12-c.m. do., 2 M.	..	1888	..	12·00	..	..
cr.	**Akitsuschima** (Medea type) . P.	4200	325 0	50 10	,,	21 2	2	5400	1 32-c.m. B.L.R., 12 12-c.m. Q.F., 6 M. .	4 f. tu. or l. ca.	1891	..	16·0	..	..
,,	**Amaki**	908	200 0	29 6	wood	13 9	1	720	1 15-c.m. B.L.R. (Krupp), 4 12-c.m. do., 2 M.	..	1877	..	11·00	150	..
corv.	**Asama** (training ship) .	1104	206 9	33 9	,,	10 10	1	300 (nom.)	8 17-c.m. B.L.R. (Krupp), 4 4½-in. do. (Armstrong), 4 l.	..	..	..	..	..	..
g.v.	**Atago**	615	164 0	27 0	steel	10 0	..	700	4 15-c.m. B.L.R. (Krupp), 2 M. . .	..	1887	..	12·00	..	..
,,	**Banjo**	595	154 0	25 0	wood	12 0	1	590	1 6-inch B.L.R., 1 4¾-inch do. . . .	..	1879	..	10·00	107	..
cr.	**Chiyota** . . . P. 1″	2450	310 0	42 0	steel Side protection amidships 4⅝″	14 0	2	5400	10 4¾-in. Q.F., 14 47-m.m. do., 3 M. . .	3 f. tu. or l. car	1890	..	19·00	..	..
corv.	**Fuziyama** (training ship) .	1000	203 0	36 0	..	11 0	1	180 (n)	2 15-c.m. Krupp, 1 6-inch Armstrong, 10 l.	..	1865	..	13·0	..	..
d.v.	**Gwaki**	600	146 4	25 3	wood	12 2	1	650	1 15-c.m. B.L.R. (Krupp), 2 12-c.m. do. .	..	1888	..	10·00	..	..
c.d.s.	**Hasidate** . . P. 2″	4277	295 0	50 10	steel 12″ armour on barbette aft	21 2	2	5400	1 32-c.m. B.L.R., 12 12-c.m. Q.F., 6 3-pdr. do., 6 M.	4 f. tu. or l. car	1891	..	16·0	..	..
g.v.	**Ho Sho**	470	120 0	24 0	steel	9 6	1	240	2 M.L.R., 2 B.L.R.	..	1868	..	11·00	50	..
c.d.s.	**Itsukusima** . . P. 2″	4277	295 0	50 10	steel 12″ armour on barbette forward	21 2	2	5400	1 32-c.m. B.L.R., 12 12-c.m. do., 5 6-pdr. Q.F., 11 3-pdr. (Hotchkiss)	4 f. tu. or l. car	1889	..	16·00	..	..
cr.	**Kaimon**	1490	210 0	32 0	steel	16 5	1	1250	1 17-c.m. 6-ton B.L.R. (Krupp), 6 12-c.m. do., 2 l.	..	1882	..	12·00	..	..
,,	**Katsuraki** . . .	1476	206 9	36 0	composite	15 0	2	1600	2 17-c.m. B.L.R. (Krupp), 5 12-c.m. do., 2 M.	2 l. car.	1885	..	13·00	..	..
g.v.	**Maya**	615	164 0	27 0	,,	10 0	..	700	4 15-c.m. B.L.R. (Krupp), 2 M. . .	..	1886	..	12·00	..	..
c.d.s.	**Metsuchima** . . P. 2″	4277	295 0	50 10	steel 12″ armour on barbette forward	21 2	2	5400	1 32-c.m. B.L.R., 12 12-c.m. do., 5 6-pdr. Q.F., and 11 3-pdr. (Hotchkiss), 6 M. .	4 f. tu. or l. car	1890	..	16·00	..	..

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cr.	**Muzasi**		1476	206	9	36	0	composite	15	0	2	1600	2 17-c.m. B.L.R. (Krupp), 5 12-c.m. do., 2 M.	2 l. car.	Bldg.	..	13·00	..	..
„	**Naniwa**	P. 3″–2″	3650	300	0	46	0	steel	18	6	2	7235	2 26-c.m. 28 ton B.L.R. (Armstrong), 6 15-c.m. 5-ton (Krupp), 2 Q.F., 10 M.	4 f. tu. or l. car	1885	..	18·72	800	9000 at 13 kts.
„	**Nis-chin**		1470	204	0	29	0	wood	14	6	1	1270	1 7-in. M.L.R. (Armstrong), 5 12-c.m. B.L.R. (Krupp)	..	..	..	11·00	..	..
„	New ship	P. 4½–1¾	4200	350	0	45	0	steel	16	6	2	15,000	4 6-in. Q.F., 8 4·7-in. do., 25 small Q.F. and M.	2 f. tu. 4 l. car.	Bldg. at Elswick.	..	23·00	1000	..
„	**Sei-ki**		810	200	0	30	0	„	13	2	1	720	1 15-c.m. B.L.R. (Krupp), 4 12-c.m. do., 2 M.	..	1875	..	11·00	130	..
„	**Shiodo**		2400	300	0	41	0	„	..	..	..		10 4·7-in. Q.F., 14 47-m.m. do., 3 M.	3 f. tu. or l. car	Bldg.	..	19·00	240	..
to.g.b.	**Shi-sama**		735	230	0	27	0	„	8	3	2	3500	.. .. ..	3 f. tu. or l. car	1891	..	21·00	..	..
cr.	**Takao**		1760	230	0	33	0	composite	13	0	2	2330	4 6-in. B.L.R., 1 4¾-in. do.	2 f. tu. or l. car	1885	..	15·00	..	..
„	**Takachiho**	P. 3″–2″	3650	300	0	46	0	steel	18	6	2	7500	2 26-c.m. 28-ton B.L.R. (Armstrong), 6 15-c.m. 5-ton do., 2 Q.F., 10 M.	4 f. tu. or l. car	1885	..	18·72	800	9000 at 13 kts.
„	**Ten-rio**		1490	200	0	32	0	wood	16	5	1	1250	1 17-c.m. 6-ton B.L.R. (Krupp), 6 12-c.m. do., 2 l.	..	1882	..	12·00	..	..
g.v.	**Tiokai**		615	154	0	27	0	steel	10	0	..	700	1 21-c.m. Krupp, 1 12-c.m. do., 2 M.	..	1887	..	10·0	..	..
„	**Tisima**		753	150	0	25	0	„	16	0	..	..	.. .. ..	..	1890	..	..	..	..
„	New ship		..	167	0	29	6	„	16	0	..	..	.. .. ..	..	Bldg.	..	..	..	..
corv.	**Tsukuba** (training ship for cadets)		1980	194	0	36	0	wood	18	0	1	350	8 guns	..	1883	..	..	..	..
cr.	**Tsukushi**		1500	210	0	32	0	steel	15	0	2	2887	2 10-in. 25-ton B.L.R. (Armstrong), 4 5-in. do., 4 M.	2 f. tu. or l. car	1882	..	17·00	250	..
„	**Yaeyama**		1600	315	0	34	6	..	15	0	2	5400	3 12-c.m. B.L.R., 6 M.	2 l. car.	1889	..	20·00	..	..
„	**Yamato**		1476	206	9	36	0	steel	15	0	1	1600	2 17-c.m. B.L.R. (Krupp), 5 12-c.m. do., 2 M.	2 f. tu. or l. car	1885	..	13·00	..	..

Paddle despatch vessel.—Jungei, 1465 tons; 1430 horse-power; Kasuga, 1015 tons; 300 nominal horse-power.

Gunboats.—Moschum, Raiden, Tschintagata; 100 to 875 tons; 60 to 80 nominal horse-power.

Also yachts, training-ships, transports, &c.

Torpedo-boats.—One built in this country and sent out in pieces and reinstated in Japan, 166 ft. long, 19½ ft. broad, of 200 tons displacement, 1600 horse-power, and 20 knots speed; and two others of the same type. Seventeen other first-class boats of 53 tons, built at Creusot, and reinstated in Japan. Four sea-going torpedo-boats of 40 tons, and 20 knots speed. Also 5 second-class boats.

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MEXICO.—Unarmoured Ships.

g.v., gun-vessel.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
g.v.	**Democrata**	450	140 0	24 10	iron	11 2	1	600	2 6½-in. 4-ton M.L.R., 2 20-pdr. B.L.R. (Vavasseur)	..	1875	..	11·00	..	..
„	**Mexico**	450	140 0	24 10	„	11 2	1	600	2 6½-in. 4-ton M.L.R., 2 20-pdr. B.L.R. (Vavasseur)	..	1875	..	11·00	..	..
„	**Zaragoza**	1200	213 3	32 10	steel	14 0	1	1300	4 12-c.m. B.L.R., 2 5·7-c.m. Q.F., 2 3·7-c.m. do.	..	1891	..	15.0	..	..

Mexico has also two 10-knot gunboats of small size, the Independencia and the Libertad, 125 ft. long and of 425 horse-power. Also five first-class torpedo-boats built or building.

MOROCCO.

Besides the steamer Hassani, the Sultan has now ordered from Orlando, at Leghorn, a cruiser which will carry four guns. Its cost will be £100,000.

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NETHERLANDS.—Armoured Ships.

a.g.b., armoured gunboat; *c.s.*, coast-service vessel; *t.*, turret ship; *b.*, barbette ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Turret.	Backing. Deck Plating.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
c.s.t.	**Bloedhond** . (iron)	1530	180 0	46 3	5½	8	9¾	9 6	2	680	1 28-c.m. 28-ton B.L.R. (Krupp), 1 7½-c.m. do., 2 3-pdr. Q.F., 2 M.	..	1869	..	8·50	90	..
„	**Buffel** . . (iron)	2198	195 6	40 0	6	8	9¾ 1″	15 6	2	2000	1 28-c.m. 28-ton B.L.R. (Krupp), 2 7½-c.m., do., 4 3-pdr. Q.F., 2 M.	..	1868	..	12·40	150	..
„	**Cerberus** . . (iron)	1530	180 0	44 0	5½	8	9¾	9 7	2	617	1 28-c.m. 28-ton B.L.R. (Krupp). 1 7½-c.m. do., 2 3-pdr. Q.F., 2 M.	..	1869	..	8·50	90	..
„	**Draak** . . (iron)	2156	201 5	49 3	8	9	11¾	10 10	2	807	2 28-c.m. B.L.R. (Krupp), 1 7½-c.m. do., 2 3-pdr. Q.F., 2 M.	..	1877	..	8·00	100	..
„	**Guinea** . . (iron)	2378	195 6	40 0	6	8	9¾ 1″	16 9	2	2000	1 28-c.m. 28-ton B.L.R. (Krupp), 2 7½-c.m. do., 4 3-pdr. Q.F., 2 M.	..	1870	..	12·00	135	..
„	**Haai** . . (iron)	1566	186 4	44 0	5½	8 5¼ C. Tower	9¾	10 2	2	672	1 28-c.m. 28-ton B.L.R. (Krupp), 1 7½-c.m. do., 2 3-pdr. Q.F., 2 M.	..	1871	..	7·00	70	..
„	**Heiligerlee** . (iron)	1530	180 0	43 7	5½	8 4¼ C. Tower	9¾	9 6	2	630	1 28-c.m. 28-ton B.L.R. (Krupp), 1 7½-c.m. do., 2 3-pdr. Q.F., 2 M.	..	1868	..	8·00	90	..
„	**Hijena** . . (iron)	1566	186 4	44 0	5½	8 5¼ C. Tower	9¾	10 2	2	654	1 28-c.m. 28-ton B.L.R. (Krupp), 1 7½-c.m. do., 2 3-pdr. Q.F., 2 M.	..	1871	..	7·00	70	..
a.g.b.	**Isala** . . (iron)	367	150 11	24 11	4	5	5 5″ 8	4 3	2	306	2 12-c.m. B.L.R. (Krupp) . .	..	1876	..	7·00	27	..
t.	**Koning der Nederlander** (iron)	5400	269 0	49 3	8	9 8 C. Tower.	11¾ 3″	20 0	2	4500	4 28-c.m. 25-ton M.L.R. (Armstrong), 4 12-c.m. B.L.R. (Krupp), 2 7½-c.m. do., 6 M.	..	1874	..	11·00	620	..
t. & b.	**Koningin Wilhelmina der Niederlanden** (steel, copper sheathed)	4600	328 0	49 3	..	11	.. 3″	19 8	2	5900	1 28-c.m. B.L.R., 1 21-c.m. do., 2 17-c.m. do., 2 7·5 do., 8 37-m.m. Q.F., 6 M.	3 f. tu. or l.car	Bldg.	..	17·0	450	..
c.s.t.	**Krokodil** . (iron)	1530	180 0	43 7	5½	8 4¼ C. Tower	9¾	9 6	2	630	1 28-c.m. 28-ton B.L.R. (Krupp), 1 7½-c.m. do., 2 3-pdr. Q.F., 2 M.	..	1868	..	8·00	90	..

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NETHERLANDS.—Armoured Ships—*continued.*

a.g.b., armoured gunboat; *c.s.*, coast-service vessel; *t.*, turret ship; *b.*, barbette ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Turret.	Backing. Deck Plating.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
c.s.t.	**Luipard** . . (iron)	1525	186 4	44 0	5½	8 5¼ C. Tower	9¾	9 2	2	680	1 28-c.m. 28-ton B.L.R. (Krupp), 1 7½-c.m. do., 2 3-pdr. Q.F., 2 M.	..	1876	..	7·00	70	..
"	**Matador** . . (iron)	1935	201 5	49 3	5½	9	9¾	10 2	2	691	2 28-c.m. 28-ton B.L.R. (Krupp), 1 7½-c.m. do., 2 3-pdr. Q.F., 2 M.	..	1878	..	7·00	100	..
a.g.b.	**Merva** . . (iron)	367	150 11	24 11	4	5	5 ⅝″	4 3	2	395	2 12-c.m. B.L.R. (Krupp) . .	..	1879	..	7·00	27	..
"	**Mosa** . . (iron)	367	150 11	24 11	4	5	5 ⅝″	4 3	2	400	2 12-c.m. B.L.R. (Krupp) . .	..	1878	..	7·00	27	..
c.s.t.	**Panter** . . (iron)	1566	186 4	44 0	5½	8 5¼ C. T.	9¾	10 2	2	660	1 28-c.m. 28-ton B.L.R. (Krupp), 1 7½-c.m. do., 2 3-pdr. Q.F., 2 M.	..	1870	..	7·00	70	..
t.	**Prinz Hendrik der Nederlander** (iron)	3375	229 7	42 7	4½	5½	9¾ ⅝″	18 1	1	2000	4 23-c.m. 13-ton M.L.R. (Armstrong), 4 12-c.m. B.L.R. (Krupp), 2 7½-c.m. do., 6 M., 2 l.	..	1866	..	12·00	350	..
t. & b.	**Reinier Claesen** (steel)	2490	229 7	44 3	4¾	11	.. 3″	15 0	2	2400	1 21-c.m. (Krupp), 1 17-c.m. do., 1 7·5-c.m. do., 3 3-pdr. Q.F., 3 M.	2 f. tu. or l.car	1891	..	16·5	90	..
a.g.b.	**Rhenus** . . (iron)	367	150 11	24 11	4	5	5 ⅝″	4 3	2	310	2 12-c.m. B.L.R. (Krupp) . .	..	1877	..	7·00	27	..
c.s.t.	**Schorpioen** . (iron)	2175	193 3	38 0	6	8 4½ Pt. Tower.	11¾	15 10	2	2225	1 28-c.m. 28-ton B.L.R. (Krupp), 2 7½-c.m. do., 4 3-pdr. Q.F., 2 M.	..	1868	..	12·00	200	1030
"	**Stier.** . . (iron)	2069	194 10	38 0	6	8 4½ P. T.	9¾	15 6	2	2257	1 28-c.m. 28-ton B.L.R. (Krupp), 2 7½-c.m. do., 4 3-pdr. Q.F., 2 M.	..	1868	..	12·40	160	..
"	**Tijger** . . (iron)	1414	187 0	44 0	5½	8 4½ C. T.	9¾	8 10	2	684	1 28-c.m. 28-ton B.L.R. (Krupp), 1 7½-c.m. do., 2 3-pdr. Q.F., 2 M.	..	1868	..	8·00	70	..
a.g.b.	**Vahalis** . . (iron)	340	120 5	27 6	4½	..	7 ⅝″	5 3	2	243	2 3-pdr. Q.F.	..	1870	..	6·00	22	..
c.s.t.	**Wesp** . . (iron)	1566	186 4	44 0	5½	8 5¼ C.T.	9¾	10 2	2	744	1 28-c.m. 28-ton B.L.R. (Krupp), 1 7½-c.m. do., 2 3-pdr. Q.F., 2 M.	..	1871	..	7·00	70	..

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NETHERLANDS.—Unarmoured Ships.

((I) denotes vessels of the Dutch Indian Navy.)
corv., corvette; *fr.cr.*, frigate-built cruiser; *cr.*, cruiser; *g.v.*, gun-vessel; *sl.*, sloop.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
sl.	Alkmaar	1010	154 3	30 2	composite	15 9	1	732	1 15-c.m. B.L.R. (Krupp), 6 12-c.m. do., 1 7½-c.m. do., 2 M.	..	1874	..	10·00	130	..
"	Aruba	778	147 7	29 6	"	12 5	1	413	1 15-c.m. M.L.R. (Armstrong), 2 12-c.m. B.L.R. (Krupp), 1 7½-c.m. do., 2 M.	..	1873	..	9·00	100	..
fr.cr.	At-jeh	3565	262 5	39 4	iron & zinc sheathed	20 7	1	2700	6 17-c.m. 6-ton B.L.R., 8 12-c.m. do. (Krupp), 2 7½-c.m. do., 8 3-pdr. Q.F., 6 M.	..	1876	..	14·50	380	3000
g.v.	Bali (I) (was Eustatius)	853	147 7	29 6	"	11 10	1	446	1 15-c.m. B.L.R., 3 12-c.m. do. (Krupp), 2 M.	..	1878	..	9·50	100	..
"	Banda (I)	645	137 10	27 7	composite	11 10	1	198	1 16-c.m. M.L.R., 2 12-c.m. B.L.R. (Krupp)	..	1872	..	9·00	80	..
"	Bandjermassin (I)	654	137 10	28 10	"	11 10	1	370	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. B.L.R. (Krupp).	..	1874	..	9·50	85	..
"	Batavia (I)	853	147 7	29 6	iron & wood	11 10	1	405	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. B.L.R. (Krupp).	..	1876	..	9·00	100	..
"	Bencoolen (I)	853	147 7	29 6	"	11 10	1	516	1 15-c.m. B.L.R., 3 12-c.m. do. (Krupp)	..	1879	..	9·60	100	..
"	Bonaire	853	147 7	29 6	"	11 10	1	412	1 15-c.m. B.L.R., 3 12-c.m do. (Krupp), 1 7½-c.m. do., 2 M., 2 l.	..	1877	..	9·00	100	..
"	Ceram (I)	550	157 4	25 4	steel	10 6	1	650	3 12-c.m. B.L.R. (Krupp), 1 7½-c.m. do., 4 M.	..	1887	..	11·00	60	..
"	Condor (I)	320	126 0	21 0	composite	10 0	1	300	2 2¾-in. B.L.R., 2 6-pdr. Q.F.	..	1885	..	10·00	25	..
fr.cr.	De Ruyter	3480	262 5	39 4	iron & zinc sheathed	20 7	1	3305	6 17-c.m. 6-ton B.L.R., 8 12-c.m. do. (Krupp), 2 7½-c.m. do., 8 3-pdr. Q.F., 4 M.	..	1880	..	14·50	380	3000
g.v.	Flores (I)	550	157 0	25 6	steel	10 6	1	650	3 12-c.m. 2-ton B.L.R., 1 7½-c.m. do.	..	1887	..	11·00	60	..
"	Halik (I)	350	125 0	20 0	composite	10 0	1	300	2 2¾-in. Q.F., 2 6-pdr. do.	..	1878	..	8·50	..	..
cr.	Java (I)	1298	197 0	31 3	iron & wood	12 3	1	1055	1 6-in. B.L.R., 3 4¾-in. do.	..	1885	..	10·60	125	..

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NETHERLANDS.—Unarmoured Ships—*continued.*

((I) denotes vessels of the Dutch Indian Navy.)

corv., corvette; ***fr.cr.***, frigate-built cruiser; ***cr.***, cruiser; ***g.v.***, gun-vessel; ***sl.***, sloop; P., continuous protective deck, with thickness of plating, in inches, under.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
fr.cr.	Johan Willem Friso	3710	262 5	39 4	iron & zinc sheathed	20 7	1	3000	6 17-c.m. 6-ton B.L.R. (Krupp), 8 12-c.m. do., 2 7½-c.m. do., 8 3-pdr. Q.F., 6 M.	..	1886	..	14·50	380	3000
„	Koningin Emma der Nederlanden	3565	262 5	39 4	iron & zinc sheathed	20 7	1	2732	6 17-c.m. 6-ton B.L.R., 8 12-c.m. do. (Krupp), 2 7½-c.m. do., 8 3-pdr. Q.F., 6 M.	..	1879	..	14·60	380	3000
g.v.	Lombok (I) . . .	600	158 0	26 3	steel	10 5	..	850	3 4·7-in. Q.F., 1 3-in. do., 2 3-pdr. do. .	..	1890	..	..	..	..
g.v.	Macassar (I) . .	853	147 7	29 6	iron & wood	11 10	1	394	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. B.L.R. (Krupp)	..	1876	..	9·00	100	..
„	Madura (I) . .	853	147 7	29 6	„	11 10	1	559	1 15-c.m. B.L.R., 3 12-c.m. do. (Krupp) .	..	1880	..	9·70	100	..
„	Padang (I). . .	853	147 7	29 6	„	11 10	1	409	1 15-c.m. B.L.R., 3 12-c.m. do. (Krupp) .	..	1878	..	9·40	100	..
„	Palembang (I) . . (requires repair)	654	137 10	28 10	composite	11 10	1	370	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. B.L.R. (Krupp)	..	1874	..	8·50	85	..
„	Pontianak (I) . .	654	147 7	29 6	„	11 10	1	360	1 18.-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. B.L.R. (Krupp)	..	1873	..	8·50	85	..
„	Samarang (I) . .	853	147 7	29 6	iron & wood	11 10	1	460	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. B.L.R. (Krupp)	..	1876	..	9·00	100	..
„	Sambas (I) . . .	654	137 10	28 10	composite	11 10	1	374	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. B.L.R. (Krupp)	..	1874	..	8·50	85	..
„	Sommelsdijk . .	1013	147 7	31 2	iron & wood	11 9	1	722	1 15-c.m. B.L.R., 3 12-c.m. do. (Krupp), 1 7½-c.m. do., 2 M., 2 l.	..	1882	..	10·00	95	..
cr.	Sumatra . . P. 1½″	1700	216 6	36 9	steel	14 0	2	3750	1 21-c.m. B.L.R., 1 15-c.m. do., 2 12-c.m. do., 6 3-pdr. Q.F., 2 M.	2 f. tu. or l. car	1891	..	17·0	170	..

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g.v.	**Sumbawa (I)** . .	600	158	0	26	3	steel	10	5	..	850	3 4·7-in. Q.F., 1 6-pdr. do., 2 3-pdr. do. .	..	Bldg.	..	..	..	..
„	New (I) . . .	600	158	0	26	3	„	10	5	..	850	6 light guns	..	Bldg.	..	..	..	..
g.v.	**Surinam** . . .	853	147	7	29	6	„	11	10	1	440	1 15-c.m. B.L.R. (Krupp), 3 12-c.m. do., 1 7½-c.m. do., 2 M., 2 l.	..	1877	..	9·00	95	..
fr.er.	**Tromp.** . . .	3565	262	5	39	4	„	20	7	1	2772	6 17-c.m. 6-ton B.L.R., 8 12-c.m. do. (Krupp), 2 7½-c.m. do., 8 3-pdr. Q.F., 6 M.	..	1877	..	14·30	380	3000
corv.	**Van Galen** . . .	2160	193	6	41	6	wood	18	2	1	833	10 12-c.m. B.L.R. (Krupp), 2 7½-c.m. do., 2 M.	..	1872	..	10·00	400	..
cr.	**Van Speyk** . . .	3575	262	5	39	4	iron & zinc sheathed	20	7	1	2891	6 17-c.m. 6-ton B.L.R., 8 12-c.m. do. (Krupp), 2 7½-c.m. do., 8 3-pdr. Q.F., 6 M.	..	1882	..	14·20	380	3000
g.v.	**Zeemeeuv (I)** . .	340	125	0	20	0	composite	10	6	1	..	2 2¾-in. Q.F., 2 6-pdr. do. . . .	..	1878	..	8·00	..	..
corv.	**Zilveren Kruis** . .	2160	193	6	41	7	wood	18	4	1	1140	10 12-c.m. B.L.R. (Krupp), 4 M. . .	..	1869	..	10·00	300	..
g.v.	**Zwalur (I)** . . .	340	123	0	21	0	composite	10	0	1	320	2 3-in. B.L.G., 2 2-in. do. . . .	..	1882	..	10·50	..	..

Gunboats (Staunch class)—Balder, Braga, Bulgia, Dufa, Freijr, Hadda, Hefring, Heimdall, Njord, Thor, Tijr, Udur, Ulfr, Vali, Vidr, Wodan, of 245 tons, and of 100 to 171 horse-power; also, Bever, Brak, Das, Dog, Ever, Fret, Geep, Gier, Havik, Hydra, Lynx, Raaf, Sperwer, Vos, of 195 tons, and 124 to 174 horse-power.

Steel gunboat.—"No. 3," 108 tons and 172 I.HP.

First-class torpedo-boats, sixteen sea-going, of about 90 tons displacement and 20 to 23 knots, built, and nine more building; two of 46 tons displacement and 21½ knots; and 23 boats of 29 tons displacement and 17 knots.

Also several large paddle steamers, training ships, transports, store-ships, surveying vessel, &c.

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NORWAY.—Armoured Ships.

c.s., t., coast-service turret ship; *a.g.b.*, armoured gunboat.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Turret.	Armour. Belt.	Backing.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Discharger.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
c.s., t.	Mjolner (iron)	1515	203 5	45 11	12	5	39	11 10	1	450	2 27-c.m. 18-ton M.L.R. (Armstrong), 1 M., 1 l.	..	1868	66,800	8·00	138	..
a.g.b.	New vessel (steel)	395	..	..	..	..	..	..	..	..	.. .. ..	..	Bldg.	..	..	..	..
c.s., t.	Skorpionen (iron)	1447	200 2	45 11	12	5	39	11 6	1	350	2 27-c.m. 18-ton M.L.R. (Armstrong), 1 M., 1 l.	..	1866	..	6·00	138	..
„	Thor (iron)	2003	203 5	49 3	14¼	7	38	13 2	1	600	2 27-c.m. 20-ton M.L.R. (Armstrong), 3 M., 1 l.	..	1872	..	8·00	200	..
„	Thrudvang (iron)	1515	200 2	45 11	12	5	39	11 10	1	500	2 27-c.m. 18-ton M.L.R. (Armstrong), 3 M., 1 l.	..	1867	..	8·00	138	..

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NORWAY.—Unarmoured Ships.

corv., corvette; *fr.cr.*, frigate-built cruiser; *g.v.*, gun-vessel; *sl.*, sloop; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes; P., continuous protective deck, with thickness of plating in inches under.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	tons.	tons.	knots.
g.v.	**Ellida**	1000	187 0	32 8	wood	14 4	2	900	5 15-c.m. 4-ton Krupp, 1 12-c.m. do., 1 l., 2 M.	1 f. tu. or l.car	1880	..	12·00	97	..
„	**Heimdal** . . .	630	167 3	26 9	steel	11 8	..	700	4 6½-c.m. Q.F.	..	1891	..	12·0	..	..
fr.cr.	**Kong Sverre** (Receiving ship) . .	3472	252 7	49 3	wood	22 4	1	1800	2 20-c.m. 7-ton M.L.R. (Armstrong), 4 17-c.m. M.L.R., 16 16-c.m. do., 22 8-in. smooth-bore, 6 l.	..	1860	..	11·00	377	..
corv.	**Nord Stjernen** . .	1609	216 6	39 4	„	17 9	1	800	6 16-c.m. 3-ton M.L.R., 10 8-in. smooth-bore, 3 l.	..	1862	..	9·00	195	..
„	**Nornen** . . .	959	172 0	36 0	„	15 9	1	240	6 16-c.m. and 6 12-c.m. guns, 2 3-pdr. Q.F., 2 l.	2 l. car.	1855	..	7·00	..	..
g.v.	**Sleipner** . . .	580	173 10	25 11	iron	9 6	2	800	1 26-c.m. 22-ton B.L.R. (Krupp), 1 15-c.m. 4-ton do., 1 M.	1 f. tu. or l.car	1877	..	12·00	80	..
„	**Viking** . . P. 1½"	1123	203 6	30 6	steel with belt of cellulose.	13 0	2	2000	2 15-c.m. B.L.R., 4 6½-c.m. Q.F., 4 37-m.m. do., 2 l.	3 l. car.	1891	..	..	..	..

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In addition to the ships and vessels given in the alphabetical lists, the Norwegian Navy possesses the following:—

Eleven Gunboats.—Brage, Glomen, Gor, Laugen, Nor, Riukan, Sarpen, Tyr, Uller, Vale, Vidar (189 to 280 tons; 100 to 450 indicated horse-power), one large gun and machine guns in each.

Sixteen smaller Gunboats.—Aasgardsrand, Arendal, Brevig, Christiansand, Dverg, Horten, Karmo, Kongsberg, Langesund, Laurvig, Lillesand, Nök, Porsgrund, Skien, Skudernoes, Tönsberg (55 tons, 70 indicated horse-power, 7½ knots); each armed with one 5½-inch gun. Also several smaller gunboats.

Torpedo-boats.—Seven first-class, and two second-class; and two Miners.

Also paddle steamer, transport, training ships, &c.

PERU.

Since the war with Chili the Peruvian Navy has been much reduced, and comprises only the following seagoing steamers:—

Lima (late Socrates), built in 1881, of 1700 tons displacement, 1800 horse-power, and 16-knot speed; fitted with two 6-in. B.L.R. guns. Also the small screw steamer Santa Rosa of about 400 tons, and the paddle steamer Peru, used as a training ship.

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PERSIA.

d.v., despatch vessel.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
d.v.	**Persepolis** . . .	1200	206 9	34 2	steel	19 7	1	454	1 10-c.m. B.L.R. (Krupp), 4 7-c.m. do . .	..	1885	..	10·00	..	..

Also one small double-screw steamer, the Sicza, for police duties, and a small 7-knot gunboat.

PORTUGAL.—Armoured Ship.

c.b., central battery-ship.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Battery.	Backing. Deck Protection.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
c.b.	**Vasco da Gama** (iron) .	2422	200 0	40 0	9	10	.. 3″	18 0	2	3605	2 26-c.m. 18-ton B.L.R. (Krupp), 2 15-c.m. do., 3 40-pdr. B.L.R. (Armstrong), 2 M.	..	1876	103,800	13·20	300	..

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PORTUGAL.—Unarmoured Ships.

corv., corvette; *g.v.*, gun-vessel; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes; P., continuous protective deck, with thickness of plating under.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
corv.	Affonso de Albuquerque	1111	205 0	33 2	iron & wood	12 3	1	1055	2 6-in. B.L.R. (Armstrong), 5 5-in. do., 3 M.	..	1884	..	12·00	150	..
„	Bartholomeu Dias .	2377	207 0	37 5	wood	20 6	1	400 (nom.)	1 6-in. B.L.R., 10 40-pdrs. . . .	..	1858	..	10·00	360	..
g.v.	Bengo. . . .	462	125 7	24 7	composite	8 10	1	400	1 6-in. B.L.R., 2 9-c.m. do. . . .	..	1879	..	10·00	80	..
„	Diego Cam . .	587	143 0	25 11	„	10 10	1	400	2 15-c.m. 4-ton B.L.R.	..	1888	..	9·00	..	..
„	Diu	640	147 0	27 0	„	13 0	1	700	1 15-c.m. B.L.R. (Krupp), 2 10½-c.m. do., 1 3-pdr. Q.F., 2 M.	..	1889	..	12·0	..	..
„	Don Luiz I. . .	600	..	..	steel	..	2	..	4 10½-c.m. B.L.R., 3 6½-c.m. Q.F., 3 M. .	..	1891	..	11·0	..	..
„	New Ship . . .	600	..	..	„	..	2	..	4 10½-c.m. B.L.R., 3 6½-c.m. Q.F., 3 M.	..	Bldg.	..	11·0	..	..
„	Douro . . .	587	143 0	25 11	wood	10 10	1	400	1 15-c.m. 4-ton B.L.R., 2 5-in. do., 1 M. .	..	1873	..	9·00	80	..
corv.	Duque de Terceira .	1418	180 2	34 2	„	14 9	1	220 (nom.)	1 17-c.m. M.L.R. (Armstrong), 4 40-pdr. do.	..	1864	..	10·00	200	..
„	Estephania . .	2368	202 5	41 4	„	17 8	1	400 (nom.)	1 7-in. B.L.R., 8 80-pdr. M.L. (Palliser) .	..	1859	..	10·00	360	..
g.v.	Liberal . . .	610	140 0	25 10	iron & wood	11 0	1	500	1 6-in. 4-ton B.L.R. (Armstrong), 2 4-in. do., 2 M.	..	1884	..	10·00	90	..
corv.	Mindello . . .	1124	169 11	35 9	composite	13 5	1	900	2 7-in. 4-ton M.L.R. (Armstrong), 4 5-in. B.L.R., 2 l.	..	1876	..	11·00	100	..
g.v.	Mandovi . . .	462	125 7	24 7	„	8 10	1	400	1 6-in. B.L.R., 2 M., 2 l.	..	1879	..	10·00	80	..
„	Quanza . . .	587	143 0	25 11	wood	10 10	1	100 (nom.)	1 6-in. 4-ton B.L.R., 2 5-in. do., 1 M. .	..	1877	..	10·00	80	..

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corv.	**Rainha de Portugal** .	1124	169 11	35 9	composite	13 5	1	900	2 7-in. M.L.R. (Armstrong), 4 5-in. B.L.R., 2 l.	..	1876	..	11·00	100	..
g.v.	**Rio Ave** . . .	380	120 0	22 0	wood	10 0	1	300	1 10 c.m. B.L.R., 2 7½-c.m.do.	..	1880	..	8·00	65	..
„	**Rio Lima** . . .	610	148 11	28 3	iron & wood	10 6	1	500	1 15-c.m. 4-ton B.L.R. (Armstrong), 4 40-pdr. do.	..	1875	..	10·00	90	..
„	**Sado**	610	148 11	28 3	composite	10 6	1	500	1 15-c.m. 4-ton B.L.R. (Armstrong), 4 40-pdr. do.	..	1875	..	10·00	90	..
„	**Tamega** . . .	610	148 11	28 3	„	10 6	1	500	1 15-c.m. 4-ton B.L.R. (Armstrong), 4 40-pdr. do.	..	1875	..	10·00	90	..
„	**Tejo**	587	143 0	25 11	wood	10 10	1	400	1 15-c.m. 4-ton B.L.R., 2 40-pdr. do. . .	..	1869	..	10·00	80	..
„	**Vouga** . . .	721	161 0	27 7	iron & wood	11 10	1	600	1 6-in. B.L.R., 4 4-in. do., 2 M. . . .	..	1882	..	9·00	100	..
„	**Zaire**	640	140 0	25 10	„	11 10	1	500	1 6-in. B.L.R. (Armstrong), 2 4-in. do., 2 M.	..	1884	..	10·00	20	..
„	**Zambezia** . . .	590	143 0	26 0	composite	10 10	1	400	1 6-in. B.L.R., 2 4-in. do., 2 M. . . .	..	1886	..	9·00	80	..
cr.	4 Cruisers (not named) P. 2¾"	4700	334 9	46 9	steel	20 0	2	11,000	4 15-c.m. B.L.R., 4 6½-c.m. Q.F., 4 M. . .	1. car.	Bldg. or projected.	..	21·0	850	5000

Gunboats (Station). — Cacongo, Guadiana, Limpopo, MacMahon, Massabi, and Vilhena, of 159 to 304 tons displacement, 220 to 375 horse-power, 10 to 12 knots speed, all built of iron or steel.

Torpedo-boat.—Espadarte, first-class, 86 ft. long, of 54 tons, and of 19 knots speed.

Three torpedo-boats, 110 feet long, 12 feet broad, 65 tons displacement, 700 indicated horse-power, 20 knots speed, built at Poplar in 1886. Five first-class Schichan torpedo boats built or building.

Torpedo-vessel or Miner.—Fulminante.

Three transports, seven screw steamers built and building, besides training ships, yachts, &c.

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ROUMANIA.

The Kingdom of Roumania has—

The Elizabeta, a protected cruiser (deck 3 in. thick), built in 1887. She is 230 ft. long, 32 ft. 10 in. broad, has 1320 tons displacement, 4500 horse-power, 18 knots speed, and carries 4 17-c.m. B.L.R. guns, 4 quick-firing guns, 4 machine guns, and 4 torpedo launching tubes.

Three coast-guard vessels—Olthul, Siretul, and Bistriti—length, 100 ft.; breadth, 13½ ft.; draught of water, 6 ft.; speed, 11 knots natural draught, and 13¼ knots with forced draught. The indicated horse-power corresponding to 11 knots speed was 160. They carry 3 machine guns. They were built by the Thames Ironworks Co., and left the Thames in August, 1888.

There are also

Six gunboats of small size, Fulgurul, Grivitza, Opanezul, Pandurul, Rahova, and Smarden, 45 to 110 tons, 100 to 180 horse-power, 7 to 9 knots speed.

Two paddle yachts, Romania and Stefan-cel Mare.

One screw steamer (two guns, two machine guns).

One steamer used for towing in torpedo work.

Three first-class torpedo-boats, 120 ft. long, 56 tons displacement, and 21 knots speed, and three others building.

Two second-class torpedo-boats, built by Yarrow in 1882.

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RUSSIA.—Armoured Ships.

(B.S., Black Sea Fleet.) *a.c.*, armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Turret or Battery.	Backing. Deck Plating.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns. B.L.R. are of Russian Krupp pattern.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	ins.	ft. in.						£	knots.	tons.	knots.
c.s., t.	**Adm. Chichagoff** (iron)	3511	254 3	42 7	6	6	17½	18 9	1	2060	2 11-in. 28-ton B.L.R., 3 M., 4 l.	..	1868	..	10·00	300	..
"	**Adm. Greig.** (iron)	3593	252 7	42 7	4½	6	17½	20 11	1	2031	3 11-in. 28-ton B.L.R., 3 M., 4 l.	..	1868	..	10·00	300	..
"	**Adm. Lazareff** (iron)	3556	252 7	42 7	4½	6	17½	20 4	1	2004	3 11-in. 28-ton B.L.R., 3 M., 4 l.	..	1867	..	10·00	300	..
a.c.	**Admiral Nachimoff** (steel, copper sheathed)	7782	330 0	61 0	10 comp.	8 barbette comp.	.. 3"	25 9	2	8000	8 8-in. 13-ton B.L.R., 10 6-in. 6-ton do., 4 3-pdr. Q.F., 6 M., 4 l.	4 f. tu. or l.car	1885	572,000	16·50	1200	..
c.s., t.	**Adm. Spiridoff** (iron)	3740	254 3	42 7	6	6	17½	19 1	1	2007	2 11-in. 28-ton B.L.R., 3 M., 4 l.	..	1868	..	10·00	300	..
b.	**Alexander II.** (steel, copper sheathed)	8440	326 0	67 0	14 comp.	10 barbette comp. battery 4-inch armour in front of each of the 9-in. guns	.. 2½"	23 0	2	8000	2 12-in. 50-ton B.L.R., 4 9-in. 19-ton do., 8 6-in. 6-ton do., 4 6-pdr. Q.F., 4 3-pdr. do., 6 M.	5 f. tu. or l.car	1887	..	15·50	..	..
c.s., t.	**Bronenosetz** (iron)	1482	200 0	45 11	5 1-in. plates	11 1-in. plates	.. 1"	12 2	1	481	2 9-in. 15-ton B.L.R.	..	1864	..	7·00	..	..
b.	**Catherine II.** B.S. (iron and steel)	10,150	331 0	69 0	16 comp.	14 barbette comp.	12 3"	27 1	2	11,000	6 12-in. (56-ton) B.L.R., 7 6-in. 6-ton do., 8 6-pdr. Q.F., 6 M.	7 f. tu. or l.car	1886	900,000	16·00	886	1350 at 14 knots
c.s., t.	**Charodeika** (iron)	2026	206 9	42 7	4½	6 turret	17½ 1"	12 2	2	786	4 9-in. 15-ton B.L.R., 1 M.	..	1867	..	8·00	250	..
a.c.	**Dimitri Donskoi** (steel, copper sheathed)	5893	296 5	52 0	6	unarmoured	.. 2½"	24 4	2	7000	2 8-in. 13-ton B.L.R., 14 6-in. 6-ton do., 14 M., 4 l.	4 f. tu. or l.car	1883	..	15·50	400	4800

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RUSSIA.—Armoured Ships—*continued.*

(B.S., Black Sea Fleet.) *a.c.*, armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Turret or Battery.	Backing. Deck Plating.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns. B.L.R. are of Russian Krupp pattern.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	ins.	ft. in.						£	knots.	tons.	knots.
b.	**Dvenadsat Apostoloff**	8076	320 0	60 0	14 comp.	12 (conning tower 5 ins.) comp.	.. 2½"	25 8	2	11,500	4 12-in. 52-ton B.L.R., 4 6-in. 6-ton do., 8 3-pdr. Q.F., 2 M.	6 f. tu. or l.car	1890	..	15·00	..	..
c.s., t.	**Edinorog** . (iron)	1407	200 0	45 11	5 1-in. plates	11 1-in. plates	39 1"	..	1	460	2 9-in. 15-ton B.L.R. . .	..	1864	..	6·00	..	..
a.c.	**Gangoot** . . .	6592	278 0	62 0	partial belt 16 comp.	armoured casemate	..	21 0	2	8300	1 12-in. B.L.R., 4 9-in. 19-ton do., 16 Q.F.	5 f. tu. or l.car	1890	..	16·50	..	..
„	**General Admiral** (iron, copper sheathed)	4604	285 5	49 3	6	unarmoured	9¾	22 11	1	4472	6 8-in. 9-ton B.L.R., 2 6-in. do., 10 M., 5 l.	2 f. tu. or l.car	1873	..	12·00	1000	..
„	**Gerzog Edinburgski** (iron and wood)	4604	285 5	49 3	6	unarmoured	9¾	22 11	1	5222	4 8-in. 9-ton 5 6-in. 4-ton B.L.R., 12 Q.F., 6 l.	2 f. tu. or l.car	1875	..	12·50	1000	..
b.	**Gheorghy Pobyedonosets**	10,280	320 0	69 0	16 comp.	12 comp.	..	26 7	2	15000	6 12-in. 56-ton B.L.R., 7 6-in. 6-ton do., 8 10-c.m. Q.F., 6 M.	7 f. tu. or l.car	1891	431,000 hull and engines	16·00	700	..
a.g.b.	**Gremyastchy** . .	1500	225 0	41 0	5	..	.. 1½"	11 0	2	2000	1 9-in. B.L.R., 1 6-in. do., 8 Q.F.	2 f. tu. or l.car	1891	..	15·0	..	..
„	**Grozyashtchy** . .	1492	229 0	41 8	5	..	.. 1½"	11 0	2	2000	1 9-in. 19-ton B.L.R., 1 6-in. 6-ton do., 8 Q.F.	2 f. tu. or l.car	1890	..	15·00	..	..
c.b.	**Kniaz Pojarski** (iron)	5007	272 4	49 3	4½—3½	4½	..	23 11	1	new machinery	8 8-in. 9-ton B.L.R., 2 6-in. 4-ton do., 10 M., 8 l.	..	1867	..	12·50	600	..

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c.s., t.	**Koldun** . . (iron)	1666	200 0	45 11·5	1-in. plates	11 1-in. plates	39 1″	12 0	1	481	2 9-in. 15-ton B.L.R.	..	1864	..	6·00	..	..
c.s., br.	**Kreml** . . . (iron)	3664	219 10	52 5	4½	4½	17½	17 4	1	1121	12 8-in. 9-ton B.L.R., 2 6-in. do., 2 M., 6 l.	..	1864	..	6·00	..	..
c.s., t.	**Latnik** . . (iron)	1515	200 0	45 11·5	1-in. plates	11 1-in. plates	39 1″	12 2	1	490	2 9-in. 15-ton B.L.R.	..	1864	..	6·00	..	..
„	**Lava** . . . (iron)	1591	200 0	45 11·5	1-in. plates	11 1-in. plates	39 1″	12 0	1	335	2 9-in. 15-ton B.L.R., 2 M.	..	1864	..	6·00	..	..
b.	**Lizoi Veliky** . .	8800	345 0	68 0	16 comp.	14 barbette comp.	..	..	2	8500	2 12-in. B.L.R., 6 6-in. do., 12 47-mm. Q.F., 4 37-mm. do.	..	Bldg.	796,000	16·0	..	..
a.c.	**Minin** . . . (iron)	6168	298 6	49 3	7	..	..	25 3	1	5290	4 8-in. 9-ton B.L.R., 12 6-in 4-ton do., 12 Q.F., 4 l.	..	1878 altered	..	13·00	..	..
c.s., br.	**Netron-Menya** . (iron)	3494	219 10	53 0	4½	4½ battery	9¾	16 5	1	1632	12 8-in. 9-ton B.L.R., 2 M., 4 l.	..	1864	..	8·00	500	..
a.c.	**Navarin** . (steel)	9476	338 0	67 0	16	12 barbettes	..	25 0	2	9000	4 12-in. 52-ton B.L.R., 8 6-in. 6-ton do., 10 Q.F.	6 f. tu. or l. car	1891	..	16·0	700	..
„	**Nicolai I.** (steel, copper sheathed)	8440	326 0	67 0	14 comp.	10 turret 6-in. battery comp.	.. 2½″	25 3	2	8000	2 12-in. 52-ton B.L.R. 4 9-in. 19-ton do., 8 6-in. 6-ton do., 10 Q.F., 8 M., 4 l.	6 f. tu. or l. car	1888	453,000	15·00	..	..
c.s.	2 New ships . . .	4020	to be built at St. Petersburgh.				..	..	..	..	.. .. ..	..	Bldg.	410,000 each	..	..	..
a.g.b.	**Nikopol,** B.S. (iron & wood)	273	98 5	27 10	3	..	9¾	5 0	2	320	.. ..	..	1868	..	8·00	..	..
circular c.s.	**Novgorod,** B.S. (iron, copper sheathed)	2706	101 0	101 0	9—7	9	*	13 5	6	2000	2 11-in. 29-ton B.L.R. 2 M., 2 l.	..	1873	..	6·00	200	..
a.g.b.	**Otvazny** . . .	1500	225 0	41 0	5	..	.. 1½″	11 0	2	2000	1 9-in. B.L.R., 1 6-in. do., 8 Q.F.	2 f. tu. or l. car	1892	..	15·0	..	..
a.c.	**Pamyat Azova** (steel) (wood sheathing over armour)	6000	377 0	50 0	9 comp.	8 barbette comp.	10 2½″	25 0	2	11500	2 8-in 13½-ton B.L.R., 14 6-in. 6-ton do., 14 Q.F. and M.	7 f. tu. or l. car	1887	350,000	18·00	1000	12,000

* Hughes' Backing.

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RUSSIA.—Armoured Ships—*continued.*

(B.S., Black Sea Fleet.) *a.c.*, armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.b.*, central battery ship; *c.s.*, coast-service vessel; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Turret or Battery.	Backing. Deck Plating.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns. B.L.R. are of Russian Krupp pattern.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	ins.	ft. in.						£	knots.	tons.	knots.
c.s., t.	Perun . . .(iron)	1549	200 0	45 11	5 1-in. plates	11 1-in. plates	.. 1″	12 2	1	338	2 9-in. 15-ton B.L.R. . .	..	1864	..	6·00	..	..
t.	Peter the Great .(iron)	8749	328 2	62 4	14—8	8+6 turret	9¾ 3″	23 0	2	8258	4 12-in. 40-ton B.L.R., 7 Q.F., 4 l.	1 f. tu. or l. car	1872	..	13·00	1200	..
br.	Petropaulowski‡ (wood)	6240	294 0	56 0	4½	4½	..	24 0	1	2800	21 8-in. 9 ton B.L.R., 1 6-in do.	..	1865	..	11·00	..	..
	Petropaulowski (new) (steel)	10,960	..	..	..	..	..	..	..	..	.. .. ..	..	Bldg.	1,098,000	..	..	..
c.s.	Pervenetz . .(iron)	3279	219 10	52 5	4½	4½	9¾	14 9	1	1067	6 8-in. 9-ton B.L.R., 6 6-in. 4-ton do., 5 M., 4 l.	..	1863	..	9·00	..	..
	Poltava (new) (steel)	10,960	..	..	..	..	..	..	..	..	.. .. ..	..	Bldg.	1,098,000	..	..	..
a.c.	Rurik . . (steel)	10,923	396 6	67 0	10 comp.	..	.. 2½	26 0	2	13250	4 8-in. 13½-ton B.L.R., 16 6-in. 6-ton do., 6 4·7-in. Q.F., 18 M.	5 f. tu. or l. car	Building at Baltic Works.		18·50	2000	20,000
„	New ship (Rurik type) (steel)	..	..	..	..	..	..	..	..	..	.. .. ..	..	..	858,600	..	..	..
c.s., t.	Rusalka . .(iron)	2026	206 9	42 7	4½	6 turret	17½	12 9	2	786	4 9-in. 15-ton B.L.R., 2 M. .	..	1867	..	8·00	250	..
c.s., br.	Sevastopol‡. (wood)	6210	295 0	52 0	4½	4½	..	25 6	1	3090	10 8-in. 9 ton. B.L.R. . .	..	1863	..	12·00	..	..
	Sevastopol (new) (steel)	10,960	..	..	..	..	..	..	2	..	.. .. ..	..	Bldg.	1,098,000	..	..	..

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b.	**Sinope, B.S.** (iron & steel)	10,181	331 0	69 0	16 comp.	14 barbette comp.	12 3″	27 1	2	13000	6 12-in. 50-ton B.L.R., 7 6-in. 6-ton do., 8 Q.F., 6 M.	7 f. tu. or l.car	1887	900,000	16·75	886	1350 at 14 kts.
a.g.b.	**Sistovo, B.S.** . (iron)	384	105 0	30 10	3	..	9¾	5 11	2	250	.. ..	..	1868	..	8·00	..	..
c.s., t.	**Smertch** . . (iron)	1520	187 0	39 4	4½	6 turret	7¾ 1″	11 6	2	700	2 9-in. 15-ton B.L.R., 1 M. .	..	1864	..	8·00	250	..
„	**Streletz** . . (iron)	1431	200 0	45 11	5 1-in. plates	11 1-in. plates	39 1″	11 6	1	444	2 9-in. 15-ton B.L.R. . .	..	1864	..	6·00	..	..
b.	**Tchesmé, B.S.** (iron & steel)	10,181	331 0	69 0	16 comp.	14 barbette comp.	12 3″	27 1	2	11000	6 12-in. (50 ton) B.L.R., 7 6-in. 6-ton do., 8 Q.F., 6 M.	7 f. tu. or l.car	1886	900,000	16·00	886	1350 at 14 kts.
„	**Tria Sviatiteli** . . (Three Saints)	12,480	..	..	..	..	..	..	2	..	.. .. ..	..	Bldg.	..	..	..	..
c.s., t.	**Tifun** . . . (iron)	1666	200 0	45 11	5 1-in. plates	11 1-in. plates	39 1″	12 5	1	453	2 9-in. 15-ton B.L.R., 1 M. .	..	1864	..	6·00	..	..
„	**Uragan** . . (iron)	1415	200 0	45 11	5 1-in. plates	11 1-in. plates	39 1″	11 6	1	432	2 9-in 15-ton B.L.R. . .	..	1864	..	6·00	..	..
circular c.s.	**Vice-Admiral Popoff,** (iron, copper sheathed) B.S.	3590	120 0	120 0	16	16 tower	9	13 5	6	3066	2 12-in. 40-ton B.L.R., 6 l. .	..	1875	..	6·00	250	..
c.s., t.	**Veshtchun** . . (iron)	1448	200 0	45 11	5 1-in. plates	11 1-in. plates	39 1″	11 6	1	529	2 9-in. 15-ton B.L.R. . .	..	1864	..	6·00	..	..
a.c.	**Vladimir Monomach** (steel, copper sheathed)	5796	296 6	52 0	6 comp.	unarmoured	.. 2″	24 11	2	7000	4 8-in. 13-ton B.L.R., 12 6-in. 4-ton do., 10 M., 4 l.	2 f. tu. or l.car	1882	..	15·40	400	..

‡ These ships are now employed for harbour service.

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RUSSIA.—Unarmoured Ships.

(Bal., Baltic Fleet; B.S., Black Sea Fleet; Sib., Siberian Squadron.)

corv., corvette; *cr.*, cruiser; *d.v.*, despatch vessel; *g.v.*, gun-vessel; *to.cr.*, torpedo cruiser; *sl.*, sloop; P., deck protected throughout, with thickness of plating under; f. tu., l. car., fixed tube or launching carriage for Fish torpedoes.

On the Russian List are the names of a large number of vessels which cannot be classified on the principles adopted in the British Navy. Many, though used for practically civil purposes, would be available for service of some kind in war. In the following Table steamers, with guns, of over 300 tons are included, and are designated despatch vessels (*d.v.*), or gun-vessels (*g.v.*).

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
sl.	Abrek, Sib.	1069	193 6	29 6	wood	13 1	1	1109	3 6-in. B.L.R., 2 M., 2 l.	..	1860	..	..	..	..
cr.	Admiral Korniloff, P. Bal. 2½"	5000	350 0	48 6	steel & wood sheathed	23 0	2	8260	2 8-in. B.L.R., 14 6-in. 6-ton do., 6 Q.F., 10 M.	6 f. tu. or l.car	1887	296,000	19·00	..	..
corv.	Afrika, Bal.	2852	285 5	39 4	iron	17 1	1	1350	5 6-in. 4-ton B.L.R., 4 M., 4 l.	..	1877	..	13·00	..	..
cr.	Aleüt, Sib. (Mining Transport)	810	150 0	31 0	steel	12 7	1	730	.. ..	..	1886	24,000	..	..	..
„	Asia, Bal.	2483	269 0	36 0	iron	16 5	1	1100	3 6-in. 4-ton B.L.R., 6 M., 5 l.	..	1878	..	12·00	..	..
„	Askold, Bal.	2245	216 6	39 4	wood	20 4	1	910	8 6-in. 4-ton B.L.R., 5 M., 4 l.	..	1863	..	9·00	..	..
„	Bayan, Bal.	1998	206 9	36 0	„	18 4	1	978	4 6-in. 4-ton B.L.R., 2 M., 4 l.	..	1857	..	10·00	..	..
g.v.	Bobr, Sib.	950	187 0	35 2	steel	10 10	2	1000	1 9-in. 15-ton B.L.R., 1 6-in. 4-ton do., 4 M., 6 l.	..	1884	43,000	14·00	..	..
corv.	Bogatyr, Bal. (Dismantled)	2204	213 3	39 4	wood	19 4	1	991	8 6-in. 4-ton B.L.R., 1 M., 4 l.	..	1860	..	9·00	..	..
g.v.	Bombory, B.S.	760	160 9	26 3	„	14 5	1	230	2 small guns	..	1852	..	..	..	..
to.cr.	Captain Sacken, B.S.	600	230 0	24 0	steel	8 10	2	3500	7 4·7-in. Q.F., 7 M.	7 l car.	1888	40,700	20·00	..	..
g.v.	Chernomoretz, B.S.	1200	210 0	35 0	„	10 0	1	2000	2 8-in. B.L.R., 1 6-in. do., 6 Q.F., 4 M.	2 f. tu. or l.car	1889	40,000	..	..	..
„	Four new vessels, B.S.	1200	210 0	35 0	„	10 0	1	2000	2 8-in. B.L.R., 1 6-in. do., 6 Q.F., 4 M.	..	Bldg.	..	..	..	..
„	Coreetz, Sib.	1200	210 0	35 0	„	10 0	2	2000	2 8-in. B.L.R., 1 6-in. do., 6 Q.F.	2 f. tu. or l.car	1886	..	..	..	..
corv.	Djigit, Bal.	1456	206 9	32 10	iron & wood	16 1	1	1383	3 6-in. 4-ton B.L.R., 4 4¾-in. do., 4 M.	..	1876	..	12·50	..	..
g.v.	Don, B.S.	354	131 3	26 0	steel & wood sheathed	10 2	1	80 (nom.)	2 small guns	..	1856	..	..	..	..
„	Donetz, B.S.	1200	210 0	35 0	steel	10 0	1	2000	2 8-in. B.L.R., 1 6-in. do., 2 Q.F., 4 M.	2 f. tu. or l.car	1887	40,000	..	..	..
„	Gonez, B.S. (Torpedo School)	745	173 10	26 0	iron	12 5	1	160 (nom.)	2 small guns	..	..	..	..	..	..

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to.cr.	**Griden**	New ship			..	..		..	..	..	..	..	..	Bldg.	66,600	..	..	..
g.v.	**Ingul, B.S.**	745	173	10	32	10	iron	12	5	1	469	2 guns	..	1872	..	..	..	..
corv.	**Jemtchug, Bal.**	1781	239	6	29	6	„	17	4	1	1438	3 6-in. 4-ton B.L.R., 6 M., 4 l.	2 f. tu. or l.car	1861	..	..	..	..
g.v.	**Jermak, Sib.**	706	154	3	26	3	„	11	2	1	125	2 guns	..	1870	..	..	..	..
„	**Kasbeck, B.S.**	692	167	4	26	3	„	11	2	1	280	2 small guns	..	1854	..	..	..	..
to.g.b.	**Kazarsky, B.S.**	400	197	0	24	4	steel	11	0	2	3500	9 47-m.m. Q.F. (Hotchkiss)	2 l. car.	1890	32,500	21·0	90	4000
„	Three new	400	197	0	24	4	„	11	0	2	3500	9 47-m.m. Q.F. (Hotchkiss).	2 l. car.	Bldg.	32,500	21·0	90	4000
„	**Kelasurs, B.S.**	307	121	4	19	7	wood	10	5	1	246	4 small guns	..	1859	..	..	..	..
corv.	**Kreyzer, Bal.**	1542	206	9	32	10	iron & wood	16	1	1	1205	3 6-in. 4-ton B.L.R., 1 M., 4 l.	..	1875	..	13·00	..	..
g.v.	**Kubanetz, B.S.**	1200	210	0	35	0	steel	10	0	1	2000	2 8-in. 10-ton B.L.R., 1 6-in. do., 6 Q.F.	3 f. tu. or l.car	1888	40,000	..	..	..
to.cr.	**Lieutenant Ilyn, Bal.**	600	230	0	24	0	„	8	10	2	3500	7 3-pdr. Q.F., 12 M.	7 f. tu. or l.car	1887	40,150	20·10	97	..
„	**Mandjur, Bal.**	1200	210	0	35	0	„	10	0	2	2000	2 8-in. B.L.R., 1 6-in. do., 6 Q.F.	2 f. tu. or l.car	1886	..	13·00	..	..
corv.	**Nayezdnik, Bal.**	1334	206	9	32	10	iron & wood	14	9	1	1719	3 6-in. 4-ton B.L.R., 5 M., 4 l.	..	1878	..	13·00	..	..
cr.	New Ship	..	..		..		..	..		..	..	..	..	Bldg.	200,000	..	..	..
cr.	New Ship	..	..		..		..	..		..	..	..	..	Bldg.	133,000	..	..	..
corv.	**Oprichnik, Bal.**	1426	206	9	32	10	steel & wood	16	0	1	1685	3 6-in. 4-ton B.L.R., 4 4-in. do., 6 M.	..	1880	..	13·00	..	..
cr.	**Pamyat Merkuriya, B.S.**	3050	292	0	39	4	iron & steel	19	7	1	800	4 18-ton B.L.R., 4 4-in. do.	2 f. tu. or l.car.	1880	..	14·00	..	..
d.v.	**Penderaklia, B.S.**	1052	190	3	29	6	iron	12	8	1	568	3 guns	..	1877	..	..	..	..
g.v.	**Pitsunda, B.S.**	335	127	11	19	7	wood	9	7	1	572	3 small guns	..	1857	..	..	..	..
sl.	**Plastun, Bal.**	1255	206	9	32	10	iron & wood	14	1	1	1543	3 6-in. 4-ton B.L.R., 4 M., 5 l.	..	1879	..	12·00	..	..
to.cr.	**Pocadnik**	..	..		..		steel	..		2	..	..	..	Bldg.	111,000	..	..	..
g.v.	**Prut, B.S.**	339	154	3	23	0	iron	7	3	1	327	2 guns	..	1849	..	..	..	..
„	**Psezuappé, B.S.**	335	127	11	19	7	„	10	5	1	216	4 small guns	..	1857	..	..	..	..
corv.	**Razboynik, Bal.**	1329	206	9	32	10	iron & wood	14	9	1	1786	3 6-in. 4-ton B.L.R., 5 M., 4 l.	..	1878	125,000	12·00	..	..
cr.	**Rynda, Bal.** P. 1½"	2950	265	9	45	11	steel & wood sheathed.	16	1	2	3600	10 6-in. 4-ton B.L.R., 6 M., 4 l.	4 f. tu. or l.car	1885	..	15·00	710	2400
g.v.	**Salgir, B.S.**	360	131	3	23	0	wood	10	5	1	107	..	..	1857	..	..	..	..
„	**Sivootch, Sib.**	950	187	0	33	2	steel	10	10	2	1000	1 9-in. 15-ton B.L.R., 1 6-in. 4-ton do., 4 M., 6 l.	..	1884	43,000	14·00	..	..
corv.	**Skobeleff, Bal.**	2397	216	6	39	4	wood	19	0	1	1042	8 6-in. 4-ton B.L.R., 3 Q.F., 1 M., 4 l.	..	1862	..	9·00	..	..

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RUSSIA.—Unarmoured Ships—*continued.*

(Bal., Baltic Fleet; B.S., Black Sea Fleet; Sib., Siberian Squadron.)

corv., corvette; *cr.*, cruiser; *d.v.*, despatch vessel; *g.v.*, gun-vessel; *sl.*, sloop; *to.cr.*, torpedo cruiser; P., deck protected throughout, with thickness of plating under; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
g.v.	Souk-Su, B.S.	307	121 4	19 8	"	10 5	1	317	3 guns	..	1859	..	..	..	..
corv.	Strjelok, Bal.	1343	206 9	32 10	iron & wood	14 2	1	1528	3 6-in. 4-ton B.L.R., 4 4-in. do., 4 M.	..	1880	..	13·00	..	..
fr.cr.	Svjetlana, Bal.	3200	223 2	49 3	wood	22 4	1	1113	6 8-in. 9 ton B.L.R., 6 6-in. 4-ton do., 7 M., 5 l.	..	1858	..	10·00	..	..
g.v.	Tamanj, B.S.	551	173 10	25 11	iron	9 7	1	745	2 guns	..	1849	..	..	..	..
"	Teretz, B.S.	1200	210 0	35 0	steel	10 0	..	2000	3 9-in. 12-ton B.L.R., 1 6-in. do., 2 Q.F., 4 M.	2 f. tu. or l.car	1888	40,000	15·0	..	..
"	Tunguz, Sib.	706	154 3	26 3	iron	11 2	1	130	4 guns	..	1870	..	..	..	..
"	Turok, B.S.	537	134 6	24 11	wood	11 2	1	422	2 guns	..	1846	..	..	..	..
"	Uraletz, B.S.	1200	210 0	35 0	steel	10 0	..	2000	3 9-in. 12-ton B.L.R., 1 6-in. do., 2 Q.F., 4 M.	3 f. tu. or l.car	1888	40,000	15·0	..	..
cr.	Vitiaz, Bal.	P. 1½"	265 9	45 11	steel & wood sheathed.	16 1	2	3000	10 6-in. 4 ton B.L.R., 9 Q.F., 3M., 4 l.	4 f. tu. or l.car	1884	125,000	15·00	710	2400
to.cr.	Voevada	New Programme			steel	..	2	..	..	..	Bldg.	111,000	..	..	..
sl.	Vjestnik, Bal.	1255	206 9	32 10	iron & wood sheathed.	14 2	1	1268	3 6-in. 4 ton B.L.R., 4 M., 4 l.	..	1879	..	12·00	..	..
sl.	Zabiyaka, Bal.	1234	219 10	29 6	iron	14 9	1	1470	2 6-in. 4-ton B.L.R., 4 M., 5 l.	..	1878	..	14·00	..	..
g.v.	Zaporojets, B.S.	1200	210 0	35 0	steel	10 0	2	1500	3 9-in. 12 ton B.L.R., 1 6-in. do., 2 Q.F., 4 M.	2 f. tu. or l.car	1887	40,000	15·0	..	..
g.v.	Two new vessels, B.S.	1200	210 0	35 0	steel	10 0	2	1500	3 9-in. 12-ton B.L.R., 1 6-in. do., 2 Q.F., 4 M.	2 f. tu. or l.car	1892	..	15·0	..	..

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Besides the ships and vessels given in the alphabetical list there are a large number of small steamers, two corvettes, Varyag and Voivoda; one cruiser, Europa; two gun-vessels, Gaidamak and Izomrod, and two gunboats, Kartetch and Otliv; torpedo-vessel, Vzriew, 118 feet long, 160 tons displacement, and 14 knots speed, used for harbour service only.

Gunboats, Staunch class (*Baltic Fleet*).—Boorya, Bouroun, Dojd, Grad, Groza, Meena, Snieg, Tutcha, Vikhr, Yersh (258 to 402 tons, 195 to 472 I.HP., 1 11-inch B.L.R., and 9 knots speed).

Gunboats (*Baltic Fleet*).—Korsun, 191 tons, and Shtcheet, 240 tons.

Steamers (*Gun-vessels, Despatch vessels, &c.*) (*Black Sea Fleet*).—Abin, Ablanova, Batjuska, Bogot, Boltun, Brate, Brestovitz, Matushka, Redoot-kali, Rodeemai, Sestritsa, Taman, Tuabse (90 to 298 tons).

Steamer (*Siberian Squadron*).—Amur (190 tons).

Also yachts, training ships, paddle steamers, and the Caspian and Lake Aral Flotillas of small vessels. Among the yachts is the circular ship Opuit, formerly the Livadia, now fitted for transport work.

Torpedo boats, Baltic (*First Class*).—Eleven, from 100 feet to 152 feet long, 100 to 134 tons displacement, a speed of 20 knots, armed with two machine guns and two to four launching tubes. Twenty-one of 100 to 130 feet long, 40 to 90 tons displacement, and speed of 17 to 22 knots; armed with two to four machine guns and two bow tubes. Ten first-class with all improvements to be built.

Second Class.—Eighty-seven of from 60 to 80 feet long, 24 tons displacement, and 17 knots speed.

Black Sea (*First Class*).—Sixteen, two of which are 152 ft. 6 in. long by 16 ft. 9 in., speed 26½ knots.

The following ships are now stated to be dismantled;—

Class.	Name.	Displacement.	Horse-Power.	Date.
		tons.		
g. v.	Gornostai (Sib.) . . .	456	150	1863
g. v.	Mors (Sib.)	456	150	1860
g. v.	Nerpa (Sib.)	379	60	1860
g. v.	Sobol (Sib.)	456	150	1863
sl.	Sokol (Sib.)	1057	346	1859
corv.	Voyin (B. S.) . . .	1652	875	1858

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Auxiliary Steamers.

Class.	NAME.	Material built of.	Where built.	When built.	Length.	Breadth.	Draught of Water.	Displacement.	Horse-power of Engines.	No. of Screws.
					ft. in.	ft. in.	ft. in.	tons.		
	Black Sea Co.									
Auxiliary Cruiser	**Argonaut**	..	..	..	..	..	..	..	..	..
"	**Czar**	steel	Newcastle	1883	319 0	37 0	23 6	2240	350 nom.	1
"	**Czarevna**	"	"	1883	319 0	37 0	23 6	2240	350 nom.	1
"	**Czaritza**	"	"	1883	319 0	37 0	23 6	2240	350 nom.	1
"	**Grand Duke Alexis**	"	"	1890	440 0	..	..	..	..	..
"	**Grand Duke Constantine**	"	"	1890	440 0	..	..	..	..	..
	Volunteer Fleet.									
"	**Kostroma**	iron	Glasgow	1873	372 0	36 0	..	3030	..	..
"	**Moskva** (was Kinfauns Castle)	"	"	1879	360 0	43 0	..	3050	2730	1
" (a)	**Nijni Novgorod** (was Saxonia)	"	Greenock	1857	321 0	40 0	..	2670	300 nom.	1
"	**Orel**	steel	Newcastle	1890	450 0	48 0	19 3	5000	9098	..
"	**St. Petersburg** (was Thuringia)	iron	Greenock	1870	340 0	41 0	..	3050	2600	1
"	**Russia** (was Holsatia)	"	"	1868	341 0	40 0	21 0	3100	2200	1
"	**Vladivostock**	"	Renfrew	1880	324 0	29 0	..	1200	..	1
" (a)	**Yaroslav**	"	La Seyne	1880	295 0	41 0	..	2350	3000	1

(a) Coast service only (Black Sea).

It is stated that five additional armed Cruisers for the Black Sea Fleet have been ordered. They are to be 450 feet long and 50 feet broad, and each ship is to cost £150,000.

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SARAWAK.

Gunboat.—Aline: length 242 ft. 6 in.; beam, 21 ft. 3 in.; tonnage, 175; 35 nom. HP.; 2 guns; launched 1875. Lorna Doone; length, 103 ft. 4 in.; beam, 17 ft. 2 in.; tonnage, 118; 40 nom. HP. 2 guns; launched 1881.

Paddle steamer, Aden. Three armed launches (50 to 100 tons).

SIAM.—Unarmoured Ships.

Two corvettes (1000 tons, 8 guns); three gun-vessels; four gunboats; yachts, and small craft.

There is also building:—

One protected deck cruiser, 290 ft. long, 39 ft. 4 in. broad, of 2500 tons displacement and 17 to 18 knots speed, and having an armament of four 12-c.m. Q.F. guns, and ten 6-pdr. Q.F. guns.

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SPAIN.—Armoured Ships.

a.c., armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.s.*, coast-service vessel; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Battery.	Backing. Deck Plating.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
a.c.	Almirante Oquendo	7000	340 0	65 0	12	10½ barbette. 12 conning tower.	.. 3″–2″	21 6	2	13,000	2 28-c.m. B.L.R., 10 14-c.m. do. 1 9-c.m. do. (all Hontoria), 8 57-m.m. Q.F., 10 M.	7 f. tu. or l.car	1891	600,000	20·00	..	..
„	Cataluna. . .	7000	340 0	65 0	12	10½ bar bette. 12 conning tower.	.. 3″–2″	21 6	2	13,000	2 28-c.m. B.L.R., 10 14-c.m. do., 1 9-c.m. do. (all Hontoria), 8 57-m.m. Q.F. do., 10 M.	7 f tu. or l.car	Bldg.	600,000	20·00	..	..
„	Cisneros . . .	7000	340 0	65 0	12	10½ bar-b-tte. 12 conning tower.	.. 3″–2″	21 6	2	13,000	2 28 c.m. B.L.R., 10 14-c.m. do., 1 9-c.m. do., (all Hontoria), 8 57-m.m. Q.F., 8 M.	7 f. tu. or l.car	Bldg.	600,000	20·00	..	..
a.g.b.	Duque de Tetuan (Harbour Service) (iron)	703	141 0	31 2	4	4	9	6 10	2	190	1 16-c.m. (Parrot), 4 bronze smooth-bores.	..	1874	..	..	23	..
a.c.	Emperador Carlos V. (steel)	9235	..	..	..	10″ turret	..	25 0	..	15,000	2 28-c.m. B.L.R. (Hontoria), 4 10-c.m. do., 4 6-pdr. Q.F., 8 M.	6 f. tu. or l.car	Bldg.	..	20·00	..	12,000
„	New ship . (steel)	9235	..	..	..	10″ turret	..	25 0	..	15,000	2 28-c.m. B.L.R. (Hontoria), 4 10-c.m. do., 4 6-pdr. Q.F., 8 M.	6 f. tu. or l.car	Bldg.	..	20·00	..	12,000
„	Infanta Maria Teresa (steel)	7000	340 0	65 0	12	10½ bar-bette. 12 conning tower	.. 3″–2″	21 6	2	13,000	2 28-c.m. B.L.R., 10 14-c.m. do., 1 9-c.m. do. (all Hontoria), 8 57-m.m. Q.F., 10 M	7 f. tu. or l.car	1890	600,000	20·00	..	..

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br.	**Numancia** (*a*) (iron)	7305	314 10	55 9	5½	5	12	25 3	1	3708	8 10-in. M.L.R. (Armstrong), 7 8-in. do., 1 9-c.m. B.L.R. (Hontoria), 2 7-c.m. do., 8 M.	2 f. tu. or l.car	1863	315,600	8·00	740	2450
b.	**Pelayo** . (steel)	9900	330 0	66 0	17¾	19¼ barbette.	.. 4″	24 11	2	8000	2 32-c.m. 48-ton B.L.R., 2 28-c.m. 38-ton B.L.R., 1 16-c.m. do., 12 12-c.m. do., 5 Q.F., 13 M.	7 f. tu. or l.car	1887	..	16·00	700	..
a.c.	**Princesa de Asturias** (steel)	7000	340 0	65 0	12	10½ barbette. 12 conning tower.	.. 3″–2″	21 6	2	13,000	2 28-c.m. B.L.R., 10 14-c.m. do., 1 9-c.m. do. (all Hontoria), 8 57-m.m. Q.F., 10 M.	8 f. tu. or l.car	Bldg.	600,000	20·00	..	..
c.s., t.	**Puig-cerda** (Harbour Service) (iron Monitor)	553	127 11	29 6	4	4	9	6 7	2	328	2 16-c.m. bronze smooth-bores, 1 16-c.m. B.L.R. (Palliser).	..	1874	..	8·00	23	..
br.	**Sagunto** (Harbour Service) (wood)	7352	292 0	55 10	6	6	24	30 1	1	3700	8 9-in. 13-ton M.L.R. (Armstrong), 3 18-c.m. (Palliser), 2 M., 8 l.	..	1869	..	8·00	900	..
a.c.	**Vizcaya** . . .	7000	340 0	65 0	12	10½ barbette. 12 conning tower.	.. 3″–2″	21 6	2	13,000	2 28-c.m. B.L.R., 10 14-c.m. do., 1 9-c.m. do. (all Hontoria), 8 57-m.m. Q.F., 10 M.	7 f. tu. or l.car	1891	600,000	20.00	..	..
b.r.	**Vitoria** (*a*) (iron)	7250	318 3	55 10	5½	5	12	25 3	1	4500	8 9-in. 13-ton M.L.R. (Armstrong), 3 8-in. do., 4 M., 6 l.	2 f. tu. or l.car	1865	..	11·00	900	..
„	**Zaragoza** . (wood)	5620	278 10	55 10	5	5	26	24 7	1	3000	4 9-in. 13-ton M.L.R. (Armstrong), 3 18-c.m. (Palliser). 8 16-c.m. do., 1 12-c.m. B.L.R., 6 8-c.m. do., 2 M.	..	1867	..	8·00	700	..

(*a*) The Numancia and the Vitoria are to be fitted with new machinery and new armaments.

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SPAIN.—Unarmoured Ships.

corv., corvette; *cr.*, cruiser; *d.v.*, despatch-vessel; *g.v.*, gun-vessel; *to.g.b.*, torpedo gun-boat; P, deck protected throughout; *pp.*, partial deck protected, with the thickness of deck plating in each case; f. tu., l. car., fixed tube or launching carriage for Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
cr.	**Alfonso XII.** (*a*) . .	3090	278 10	42 7	steel	16 5	1	4800	6 16-c.m. B.L.R. (Hontoria), 2 7-c.m. do., 6 6-pdr. Q.F., 4 3-pdr. do., 5 M.	5 f. tu. or l.car	1887	..	17·50	600	..
"	**Alfonso XIII.** . . P. 6″–3″	5000	318 6	50 6	"	20 0	2	11,000	4 24-c.m. B.L.R. (Hontoria), 6 12-c.m. do., 8 Q.F., 8 M.	5 f. tu. or l.car	1891	..	20·00	1100	..
cr.	**Almanza** (Surveying ship) .	3960	275 7	49 3	wood	20 11	1	600 (nom.)	22 16-c.m. M.L.R. (Palliser), 2 M., 6 l. .	..	1864	..	7·00	650	..
g.v.	**Animosa** (Colonial Guard ship)	510	150 11	26 3	iron	7 7	1	100 (nom.)	1 16-c.m. 6-ton M.L.R. (Palliser), 1 12-c.m. bronze smooth-bore, 2 l.	..	1860	..	8 00	..	..
cr.	**Aragon**	3342	246 0	45 11	wood	20 11	1	4400	6 16-c.m. B.L.R. (Hontoria), 6 8·7-c.m. do. (Krupp), 2 M.	..	1879	..	14·00	470	..
to.g.b.	**Audaz**	600	190 0	23 0	steel	10 4	2	2600	2 12-c.m. B.L.R. (Hontoria), 4 5·7-c.m. Q.F., 1 M.	2 l. car.	1889	..	18·0	106	..
cr.	**Blanca** (Colonial Guard ship)	2452	209 11	42 7	wood	18 4	1	360 (nom.)	12 20-c.m. smooth-bores, 4 16-c m. do., 4 l.	..	1859	..	8·00	300	..
"	**Carmen** (Colonial Guard ship)	3116	242 9	45 11	"	19 7	1	600 (nom.)	16 20-c.m. smooth-bores, 4 16-c.m. do., 4 l.	..	1861	..	8·00	460	..
"	**Castilla**	3342	246 0	45 11	"	20 11	1	4400	4 15-c.m. B.L.R. (Krupp), 2 12-c.m. do., 4 7½-c m. do., 8 Q.F., 2 M.	2 l. car	1881	..	14·00	470	..
"	**Concha**	524	157 5	25 7	iron	8 7	2	600	3 12-c m. B.L.R. (Hontoria), 3 M. . .	1 l. car	1883	..	11·50	80	..
"	**Concepcion** (Colonial Guard ship)	3210	229 7	45 11	wood	20 1	1	2100	5 16-c.m. M.L.R., 16 20-c.m. smooth-bores, 4 l.	..	1860	..	8·00	360	..
"	**Conde de Venadito** . .	1130	210 0	32 0	iron	12 6	1	1600	4 12-c.m. B.L.R. (Hontoria), 2 7-c.m. do., 4 Q.F., 1 M.	2 f. tu. or l.car	1888	..	14·00	220	..
"	**Cristobel Colon** . .	1130	210 0	32 0	"	12 6	1	1600	4 12-c.m. B.L.R. (Hontoria), 2 7-c.m. do., 4 Q.F., 1 M.	2 f. tu. or l.car	1887	..	14·00	220	..

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cr.	**Don Antonio Ulloa** . .	1130	210	0	32	0	iron	12	6	1	1600	4 12-c.m. B.L.R. (Hontoria), 2 7-c.m. do., 6 Q.F., 2 M.	2 f. tu. or l.car	1887	..	14·00	220	..
„	**Don Juan de Austria** .	1130	210	0	32	0	„	12 mean dt.	6	1	1600	4 12-c.m. B.L.R. (Hontoria), 3 5·7-c.m. Q.F., 2 4·2-c.m. do., 1 3-pdr. do., 1 M.	3 f. tu. or l.car	1887	..	14·00	..	..
to.g.b.	**Destructor** . . .	458	192	6	25	0	steel	7	0	2	3800	1 9-c.m. B.L.R., 4 6-pr. Q.F., 4 M. . .	3 f. tu. or l.car	1887	..	22 56	..	5500
g.v.	**El Cano**	524	157	5	25	7	iron	8	6	2	600	3 12-c.m. B.L.R. (Hontoria), 1 9-c.m. do., 3 M.	1 l. car	1885	..	11·50	80	..
cr.	**Ensenada** . . . *pp.* 2½″–1″	1030	185	0	30	0	steel	11	6	2	1600	4 12-c.m. B.L.R. (Hontoria), 5 Q.F., 4 M. .	3 f. tu. 1 l. car	1890	..	15·00	..	..
d.v.	**Fernando el Catolico** .	500	157	5	25	7	iron	8	5	2	550	1 16-c.m. M.L.R. (Palliser), 2 12-c.m. smooth-bores, 1 M.	..	1875	..	10·00	20	..
to.g.b.	**Galicia**	600	190	0	23	0	steel	10	4	2	2600	2 12-c.m. B.L.R. (Hontoria), 4 5·7-c.m. Q.F., 1 M.	2 l.car.	1891	..	18·0	106	..
g.v.	**General Lezo** . . .	524	157	5	25	7	iron	8	6	2	600	3 12-c.m. B.L.R. (Hontoria), 1 Q.F., 2 M. .	1 l.car	1885	..	11·00	80	..
cr.	**Gerona** (Gunnery Ship) .	3980	265	9	49	3	wood	20	8	1	600 (nom.)	16 16-c.m. M.L.R., 4 9-c.m. (Hontoria), 2 Q.F., 2 M.	..	1864	..	9·00	675	..
sl.	**Infanta Isabel** . . .	1130	210	11	32	2	iron	12	5	1	1500	4 12-c.m. B.L.R. (Hontoria), 2 7-c.m. do., 4 Q.F., 4 M.	2 l. car	1885	..	14·00	220	..
„	**Isabel II.**	1130	210	11	32	2	„	12	5	1	1500	4 12-c.m. B.L.R. (Hontoria), 2 7-c.m. do., 4 Q.F., 3 M., 2 l.	2 l. car	1886	..	14·00	220	..
cr.	**Isla de Cuba** . . *pp.* 2½″–1″	1030	185	0	30	0	steel	11	6	2	2200	4 12-c.m. B.L.R. (Hontoria), 4 6-pdr. Q.F., 1 3-pdr. do., 2 M.	3 f. tu. or l.car	1887	..	16·00	160	..
„	**Isla de Luzon** . . *pp.* 2½″–1″	1030	185	0	30	0	„	11	6	2	2200	4 12-c.m. B.L.R. (Hontoria), 4 6-pdr. Q.F., 1 3-pdr. do., 2 M.	3 f. tu. or l.car	1887	..	16·00	160	..
„	**Jorge Juan** . . .	935	203	5	29	6	wood	12	2	1	1100	3 16-c.m. 6-ton M.L.R. (Palliser), 2 7½-c.m. B.L.R. (Krupp), 2 M., 2 l.	..	1876	..	13·00	130	..
„	**Lepanto** . . . P. 6″–3″	5000	318	6	50	6	steel	20	0	2	11,000	4 24-c.m. B.L.R. (Hontoria), 6 12-c.m. do., 6 6-pdr. Q.F., 4 3-pdr. do., 5 M.	5 f. tu. or l.car	Bldg.	..	20·00	1100	..
„	**Magellanes** . . .	524	157	5	25	7	iron	8	6	2	600	3 12-c.m. B.L.R. (Hontoria), 3 M. . .	1 l. car	1885	..	11·00	80	..
d.v.	**Marques del Duero** . .	500	157	5	25	7	„	8	5	2	550	1 16-c.m. M.L.R. (Palliser), 2 12-c.m. smooth-bores, 1 M.	..	1875	..	10·00	90	..
to.g.b.	**Marques de Molins** . .	600	190	0	23	0	steel	10	4	2	2600	2 12-c.m. B.L.R. (Hontoria), 4 5·7-c.m. Q.F., 1 M.	2 l. car	1891	..	18·00	106	..
cr.	**Navarra**	3342	232	11	42	7	wood	20	4	1	4400	4 15-c.m. B.L.R. (Krupp), 2 12-c.m. do., 2 8·7-c.m. do., 8 Q.F., 2 M.	2 l. car	1881	..	14·00	470	..

(*a*) To be used as a Torpedo Depot Ship and Magazine.

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SPAIN.—Unarmoured Ships—*continued.*

corv., corvette; *cr.*, cruiser; *d.v.*, despatch-vessel; *g.v.*, gun-vessel; *to.g.b.*, torpedo gun-boat; P, deck protected throughout; *pp.*, partial deck protected; f. tu., l. car., fixed tube or launching carriage for Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in						£	knots.	tons.	knots.
to.g.b.	New (A, B, C, D)*. . .	750	233 0	27 0	steel	8 0	2	4600	2 4·7 Q.F., 4 42-m.m. Q.F., 2 M. . .	4 f. tu. or l.car	Bldg.	100,840	20·00	..	2600
„	Nueva Espana . . .	600	190 0	23 0	„	10 4	2	2600	2 12-c.m. B.L.R. (Hontoria), 4 5·7-c.m. Q.F., 1 M.	2 l. car.	1889	..	18·00	106	..
g.v.	Prosperidad . . .	420	141 0	22 7	wood	9 7	1	134	2 12-c.m. B.L.R. (Hontoria), 1 7½-c.m. do., 1 M.	..	1865	..	6·00	80	..
to.g.b.	Rapido	600	190 0	23 0	steel	10 4	2	2600	2 12-c.m. B.L.R. (Hontoria), 4 5·7-c.m. Q.F., 1 M.	2 l. car.	1891	..	18·00	106	..
cr.	Reina Christina (*a*) . .	3090	278 10	42 7	„	16 5	1	4800	6 16-c.m. B.L.R. (Hontoria), 2 7-c.m. do., 3 5·7-m.m. Q.F., 2 4·2-c.m. do., 6 3-pdr. do.	5 f. tu. or l.car	1886	..	17·50	600	..
„	Reina Mercedes (*b*) . .	3090	278 10	42 7	„	16 5	1	4800	6 16-c.m. B.L.R. (Hontoria), 2 7-c.m. do., 3 5·7-c.m. Q.F., 2 4·2-c.m. do., 6 3·7-c.m. do.	5 f. tu. or l.car	1887	..	17·50	600	..
„	Reina Regente . . P. 6″–3″	5000	318 6	50 6	„	20 0	2	11,000	6 16-c.m. 5½-ton B.L.R. (Hontoria), 6 12-c.m. do., 6 6-pdr. Q.F., 4 3-pdr. do., 5 M.	5 f. tu. or l.car	1887	..	20·70	1100	..
sl.	Sanchez Barcaistegui .	935	203 5	29 6	wood	12 2	1	1100	3 16-c.m. 6-ton M.L.R. (Palliser), 2 7½-c.m. B.L.R. (Krupp), 2 M.	..	1876	..	13·00	130	..
to.g.b.	Temerario	600	190 0	23 0	steel	10 4	2	2600	2 12-c.m. B.L.R. (Hontoria), 4 5·7-c.m. Q.F., 1 M.	2 l. car	1889	..	20·5	106	..
corv.	Tornado (Torpedo School ship)	2090	219 10	32 10	composite	14 5	1	328 (nom.)	2 16-c.m. M.R.L. (Palliser), 2 12-c.m. smooth-bores, 2 l.	..	1866	..	9·00	350	..
sl.	Velasco	1152	209 11	29 3	iron	12 5	1	1500	3 15-c.m. 4-ton B.R.L. (Armstrong), 2 7-c.m. B.L.R. (Hontoria), 2 M.	..	1881	..	14·30	220	..
g.v.	Veloz	600	190 0	23 0	steel	10 4	2	2600	2 12-c.m. B.L.R. (Hontoria), 4 5·7-c.m. Q.F., 1 M.	2 l. car.	Bldg.	..	18·0	106	..
cr.	Venadito	1150	..	..	..	..	..	..	.. ..	..	1891	..	14·5	..	..

* Armoured Conning Tower 9¾ inches thick.

(*a*) To be used as a Transport.

(*b*) To be used as a Cavalry Transport.

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Besides the ships and vessels in the alphabetical list there are the paddle-vessels, Ferrolano, Gaditano; training ships and transports; also

Gunboats.—Alsedo, Cocodrillo, Cuba-Española, Eulalia, Pelicano, Pilar, Salamandra (216 to 245 tons, 185 to 345 I.HP.).

Small steamers, classed as third-class gunboats, &c., forty-nine in number (35 to 348 tons).

Torpedo-boats.—Six seagoing torpedo-boats of the Ariète type, of 135 feet in length, 108 tons displacement and 26·11 knots speed; two torpedo-boats of the Falke type, 108 tons displacement, 135 feet in length, and 23 knots speed; and twenty-eight other first-class boats built or building.

Three second-class torpedo-boats, and the submarine boat, Peral, of 87 tons.

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SWEDEN.—Armoured Ships.

a.g.b., armoured gunboat; *c.s.*, coast-service vessel; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Turret.	Armour. Water-line.	Backing. Deck Plating.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
a.g.b.	Berserk . (iron)	452	131 3	29 6	14	2½	34 ¾"	8 3	2	155	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1874	..	8·00	19	..
„	Bjorn . (iron)	457	131 3	26 3	14	2½	34 ¾"	8 3	2	155	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1874	..	8·00	19	..
„	Fenris . (iron)	259	104 11	22 4	11	2	34 ¾"	7 10	1	44	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1872	..	6·00	7	..
„	Folke . (iron)	460	131 3	26 3	14	2½	34 ¾"	8 3	2	155	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1875	..	8·00	19	..
„	Garmer . (iron)	268	91 10	22 11	6	2	8 1"	7 7	1	90	1 27-c.m. 24-ton. M.L.R., 2 M.. .	..	1868	..	6·00	15	..
„	Gerda . (iron)	457	131 3	26 3	14	2½	34 ¾"	8 3	2	133	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1873	..	8·00	19	..
c.s., t.	Gota . (steel)	3135	258 6	48 0	11½–9¾ 10½ C.T.	11½	.. 2"	16 0	2	4677	2 10-in. 29-ton B.L.R., 4 6-in. do., 4 Q.F. do., 6 M.	3 f. tu. orl.car.	1890	..	15·96	200	..
„	Hildur . (iron)	457	131 3	26 3	14	2½	34 ¾"	8 3	2	133	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1872	..	8·00	19	..
c.s., t.	John Ericsson (iron)	1500	200 2	45 11	11½ 9¾ C. T.	4½	31½ 1"	11 6	1	380	2 24-c.m. 15-ton B.L.R., 2 M. . .	..	1865	..	6·00	112	..
„	Loke . (iron)	1600	205 3	45 11	18 9¾ C. T.	4½	40 1"	11 10	1	430	2 24-c.m. 15-ton B.L.R., 3 M. . .	..	1871	..	7·00	112	..
a.g.b.	Skold . (iron)	247	104 11	22 4	9	1	34 ¾"	8 3	1	17	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1869	..	4·00	5	..
„	Sölve . (iron)	454	131 3	29 6	14	2½	34 ¾"	8 3	2	155	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1875	..	8·00	19	..
c.s., t.	Svea . (steel)	2900	249 4	49 3	11½ 10½ C.T.	11½	.. 2"	15 9	2	3100	2 10-in. 27-ton B.L.R. (Armstrong), 4 6-in. 4-ton do., 4 Q.F., 6 M.	3 f. tu. orl.car.	1886	127,300	15·45	200	800 at 12 knots.
t.	Thordon . (iron)	1500	200 2	45 11	11½ 9¾ C. T.	4½	26 1"	11 6	1	380	2 24-c.m. 15-ton B.L.R., 2 M. . .	..	1866	..	6·00	112	..
c.s., t.	Thule . (steel)	3135	249 4	49 3	11½ 10½ C.T.	11½	22 2"	15 9	2	3150	2 10 in. 27-ton B.L.R. (Armstrong), 4 6-in. 4-ton do., 4 Q.F., 6 M.	3 f. tu. orl.car.	Bldng.	..	16·0	..	..
„	Tirfing . (iron)	1500	200 2	45 11	11½ 9¾ C. T.	4½	26 1"	11 6	1	380	2 24-c.m. 15-ton B.L.R., 2 M. . .	..	1867	..	6·00	112	..
a.g.b.	Ulf . . (iron)	457	131 3	26 3	14	2½	34 ¾"	8 3	2	155	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1873	18,000	8·00	20	..

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SWEDEN.—Unarmoured Ships.

corv., corvette; *fr. cr.*, frigate-built cruiser; *g.v.* gun-vessel; *tor. ship*, torpedo ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
corv.	Balder	1886	203 5	36 0	wood	18 4	1	1380	2 15-c.m. B.L.R. (Armstrong), 6 12-c.m. B.L.R., 2 Q.F., 4 M.	..	1870	..	12·00	200	940
g.v.	Blenda	500	167 4	25 11	iron	9 2	2	590	1 27-c.m. 24-ton B.L.R. (Armstrong), 1 12-c.m. B.L.R., 2 M.	..	1875	..	12·00	98	..
„	Disa	500	167 4	25 11	„	9 2	2	590	1 27-c.m. 24-ton B.L.R. (Armstrong), 1 12-c.m. B.L.R., 2 M.	..	1877	..	12·00	98	..
tor. ship.	Drott (was Ran) . . .	630	173 10	26 3	„	9 6	2	960	4 Engström, Q.F..	3 f. tu. or l.car	1877	..	13·00	100	1000
g.v.	Edda	640	180 5	27 3	„	9 6	2	960	1 27·4-c.m. 27-ton B.L.R., 1 15-c.m. do., 2 Q.F., 2 M.	..	1882	..	13·00	80	..
corv.	Freja	2000	216 6	39 4	steel&wood	18 9	1	1750	4 15-c.m. 4-ton B.L.R., 8 12-c.m. do., 2 Q.F., 4 M.	..	1885	..	12·00	180	..
g.v.	Rota	537	170 7	26 3	iron	9 2	2	780	1 27-c.m. 24-ton B.L.R., 1 12-c.m. do., 2 M.	..	1878	..	13·00	80	..
corv.	Saga (School Ship) . .	1535	200 2	32 10	wood	17 1	1	900	1 15-c.m. 5-ton B.L.R. (Armstrong), 6 12-c.m. B.L.R., 4 M., 2 l.	..	1878	..	11·00	170	..
g.v.	Skaggald	537	170 7	26 3	iron	9 2	2	780	1 27-c.m. 24-ton B.L.R., 1 12-c.m. do., 2 M.	..	1879	..	13·00	80	..
„	Skagul	537	170 7	26 3	„	9 2	2	780	1 27-c.m. 24-ton B.L.R., 1 12-c.m. do., 2 M.	..	1878	..	13·00	80	..
„	Skuld	537	170 7	26 3	„	9 2	2	780	1 27-c.m. 24-ton B.L.R., 1 12-c.m. do., 2 M.	..	1880	..	13·00	80	..
„	Urd	537	170 7	26 3	„	9 2	2	780	1 27-c.m. 24-ton B.L.R., 1 12-c.m. do., 2 M.	..	1877	..	13·00	80	..
fr. cr.	Vanadis	2136	209 11	42 7	wood	20 1	1	1400	10 12-c.m. B.L.R., 2 Q.F., 4 M. . .	..	1862	..	11·00	235	..
g.v.	Verdande	537	170 7	26 3	iron	9 2	2	780	1 27-c.m. 24-ton B.L.R., 1 12-c.m. do., 2 M.	..	1879	..	13·00	80	..

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Gunboats.—Alfhild, Aslog, Astrid, Gunhild, Sigrid (180 to 200 tons, and about 130 I.HP.), each carrying 1 12-c.m. B.L.R. and 2 M. Also the Svenskund of 280 tons and 440 H.P., armed with 4 quick-firing guns.

Torpedo-boats—First-class: four of 65 tons and 19 knots speed, and two building, eight other first-class boats of 40 tons displacement and 19 knots speed, one of 34 tons displacement and 16 knots speed; seven other boats of smaller size and less speed; and a large number of small boats fitted with spar torpedoes.

The Swedish Navy has, besides the Torpedo School-vessel Ran, built of steel and of 175 tons displacement, 140 I.HP. and 10 knots speed, training ships, transports, surveying vessels, and some steamers of old construction.

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TURKEY.—Armoured Ships.

a.g.b., armoured gunboat; *br.*, broadside ship; *c.b.*, central battery ship; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Turret or Battery.	Armour. Belt.	Backing.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
c.b.	**Assar-i-Schefket** .(iron)	2080	203 5	42 7	4½	6	9	16 5	2	1750	1 9-in. B.L.R. (Armstrong), 4 7-in. do., 4 l., 4 M.	..	1868	..	11·00	300	..
,,	**Assar-i-Tevfik** .(iron)	4687	272 4	52 6	6	8	9	24 11	1	3560	6 9-in. 12-ton M.L.R. (Armstrong), 2 21-c.m. B.L.R. (Krupp), 4 l., 7 M.	..	1868	..	13·00	400	..
,,	**Avni-Illah** . . .(iron)	2400	226 4	36 0	5	6	10	16 5	1	2200	4 9-in. 12-ton M.L.R. (Armstrong), 1 12-c.m. K. B.L., 1 l., 4 M.	..	1869	..	12·00	220	..
br.	**Azazieh** (*a*) . .(iron)	6400	292 0	55 9	5	5½	9	25 7	1	3735	1 9-in. 12-ton M.L.R. (Armstrong), 17 8-in. 7-ton do., 8 M.	..	1864	..	13·00	750	..
c.b.	**Feth-i-Bulend** . .(iron)	2806	236 3	39 4	6	9	10	18 1	1	3250	4 9-in. 12-ton M.L.R. (Armstrong), 2 12-c.m. B.L.R., 2 l., 4 M.	1 l. car.	1869	..	13·00	300	..
a.g.b.	**Feth-el-Islam** . .(iron)	335	101 9	24 7	3	3	10	5 11	1	290	2 7-in. (Armstrong), 2 l. . . .	..	1864	..	8·00	20	..
c.b.	**Hamidieh** . . .(iron)	6700	292 0	55 9	5	9	18	24 10	1	6800	10 24-c.m. 13-ton B.L.R. (Krupp), 2 17-c.m. 6-ton do., 6 l., 7 M.	2 l. car.	1885	..	13·00	600	..
a.g.b.	**Hisber** (was Nusritieh) (iron)	404	144 4	30 10	3	3	5½	5 7	1	400	2 15-c.m. B.L.R. (Krupp), 2 l., 2 M. .	..	1875	..	7·00	20	..
t.	**Hufzi-el-Rahman** .(iron)	2540	204 0	45 11	5	4½	10	14 5	1	200 nom.	2 9-in. 12-ton M.L.R. (Armstrong), 2 7-in. 6-ton do., 1 5-in. (Krupp), 6 M.	..	1868	..	12·00	200	..
c.b.	**Idjilalieh** . . .(iron)	2266	213 3	42 7	4·5	6	13	17 4	1	1800	2 9-in. 12½-ton M.L.R. (Armstrong), 2 7-in. 6-ton do., 1 15-c.m. B.L.R. (Krupp), 4 M.	..	1870	..	11·00	300	..
br.	**Mahmudieh** . .(iron)	6400	292 0	55 9	5	5½	9	25 7	1	3735	1 9-in. 12-ton M.L.R. (Armstrong), 14 8-in. 6-ton do., 2 15-c.m. B.L.R. (Krupp), 7 M.	..	1864	..	12·00	750	..
a.g.b.	**Meindooyeh** (was Semendrieh) . . .(iron)	335	101 9	24 7	3	3	10	5 11	1	290	2 7-in. (Armstrong), 2 l. . . .	..	1864	..	8·00	20	..
c.b.	**Mesoodieh** . . .(iron) (Sister to the English ship Superb)	9120	331 5	59 0	10 1″	12	10	25 11	1	7431	12 10-in. 18-ton M.L.R. (Armstrong), 3 15-c.m. B.L.R. (Krupp), 7 M., 6 l.	..	1874	..	13·00	600	..
,,	**Muin-i-Zaffer** . .(iron)	2400	230 0	36 0	5	6	10	16 5	2	2200	4 9-in. 12-ton M.L.R. (Armstrong), 1 12-c.m. K., 2 l., 4 M.	..	1869	..	12·00	220	..
,,	**Mukadim-i-Hair** .(iron)	2806	236 3	39 4	6	9	10	18 1	1	3000	4 9-in. 12-ton M.L.R. (Armstrong), 1 12-c.m. B.L.R. (Krupp), 2 l., 4 M.	..	1872	..	12·00	300	..
,,	**Nedjim-i-Schefket** .(iron)	2080	203 5	42 7	4½	6	9	16 5	2	1900	5 8-in. 7-ton M.L.R. (Armstrong), 4 l., 4 M.	..	1868	..	11·00	300	..
br.	**Orkanieh** . . .(iron)	6400	292 0	55 9	5	5½	9	25 7	1	3735	1 9-in. 12-ton M.L.R. (Armstrong), 17 8-in. 6-ton do., 1 15-c.m. B.L.R. (Krupp), 7 M.	..	1865	..	12·00	750	..
,,	**Osmanieh** (*a*) . .(iron)	6400	292 0	55 9	5	5½	9	25 7	1	3735	1 9-in. 12-ton M.L.R. (Armstrong), 17 8-in. 6-ton do., 8 M.	..	1864	..	12·00	750	..

(*a*) The Azazieh and Osmanieh are being converted. They are to be cut down forward and aft, and a barbette fitted at each end with one 26-c.m. B.L. (Krupp) in each. The secondary armament will be 8 15-c.m. (Krupp), 6 10-c.m. do., 7 M., and 2 l., and 2 l. car. for torpedoes. There is also one ironclad of about 8600 tons displacement, now on the stocks building.

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TURKEY.—Unarmoured Ships.

***cr.*, cruiser; *g.v.*, gun-vessel; *sl.*, sloop; *to.g.b.*, torpedo gunboat.**

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
g.v.	Beyruth	609	173 6	26 7	..	12 10	1	160	2 12-c.m. B.L.R. (Krupp), 2 M., 2 l.	..	1863–89	..	10·00	120	..
sl.	Brussa	800	172 6	30 6	wood	15 2	1	150	2 6-in. B.L.R. (Krupp), 2 12-c.m. do., 2 M.	..	1859–87	..	11·00	120	..
to.g.b.	Edider	..	154 0	18 4	steel	7 3	2	2500	5 4·7-c.m. Q.F. . .	2 l. car.	1890	..	24·0	..	..
„	New	..	187 0	18 4	„	..	2	..	6 3·7-c.m. Q.F. . .	2 l. car.	Bldng.	..	20·0	..	..
sl.	Edirneh	782	172 6	30 6	wood	14 2	1	150	2 6-in. B.L.R. (Krupp), 2 12-c.m. do., 2M.	..	1859–87	..	11·00	120	..
cr.	Fezibahri	1815	226 0	35 0	steel	14 0	2	2500 ind.	6 15-c.m. B.L.R. (Krupp)	7 f. tu. or l.car	Bldng.	..	17·0	..	..
„	Heibetnuma	1960	226 0	37 0	steel & wood	14 0	1	2500 ind.	3 17-c.m. (Krupp), 6 12-c.m. do., 6 l.	2 l. car.	1890	..	14·00	..	..
„	Hudavendikiar . . P.	4050	279 0	49 3	steel	21 0	2	..	2 21-c.m. B.L.R. (Krupp), 6 15-c.m. do., 4 10½-c.m. do.	5 f. tu. or l.car	Bldng.	..	..	..	..
„	Two new . . . . P.	4050	279 0	49 3	„	21 0	2	..	2 21-c.m. B.L.R. (Krupp), 6 15-c.m. do., 4 10½-c.m. do.	5 f. tu. or l.car	Bldng.	..	..	..	..
gv.	Iskenderieh	609	173 6	26 7	wood	12 10	1	160	2 12-c.m. B.L.R. (Krupp), 2 M., 4 l.	..	1863–85	..	11·00	120	..
„	Lufihumaum	1160	210 0	35 0	composite	14 0	1	1800 ind.	3 17-c.m. (Krupp), 6 12-c.m. do, 6 l.	2 l. car.	Bldg.	..	14·00	..	..
sl.	Mansureh	800	174 10	30 6	wood	15 2	1	150	2 6-in. B.L.R. (Krupp), 2 12-c.m. do., 2 M.	1 l. car.	1863–88	..	11·00	120	..
„	Mehemet Selim	1300	196 10	32 10	„	16 6	1	450	10 15-c.m. B.L.R. (Krupp), 4 M., 4. l.	1 l. car.	1875	..	11·00	250	..
g.v.	Mehrieh	609	173 6	26 7	„	12 10	1	160	2 4¾-in. B.L.R. (Krupp) .	..	1863	..	10·00	120	..
cr.	Mookbir-i-Sooroor (T. Sch.)	1477	209 11	38 0	..	17 5	1	450	22 guns . . .	..	1879	..	..	..	..

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sl.	**Muzafer**	800	174 10	30 6	wood	15 2	1	150	2 6-in.5-ton B.L.R.(Krupp), 2 12-c.m. do., 2 M.	1 l. car.	1863–88	..	12·00	150	..
to.g.b.	**Namet**	900	230 0	31 0	steel	16 6	..	4500	2 10½-c.m. B.L.R. (Krupp), 6 8½-c.m. do.	4 f. tu. or l.car	1890	..	19·00	..	..
„	Not named (2 vessels) . .	260	200 0	20 3	„	8 0	2	2700	1 4-in. B.L.R., 6 M. . .	..	1890	..	21·00	..	..
sl.	**Sedul Bahr** . . .	609	173 6	26 7	wood	12 10	1	160	4 4¾-in. B.L.R. (Krupp), 6 M.	..	1859–85	..	10·00	120	..
cr.	**Selimieh** . . . P.	4050	279 0	49 3	steel	21 0	2	..	2 21-c.m. B.L.R. (Krupp), 6 15-c.m. do., 4 10½-c.m. do.	..	Bldng.	..	..	..	..
fr.cr.	**Selimieh** (Gunnery Ship) .	4717	279 0	59 0	wood	23 7	1	600 nom.	2 8-in. B.L.R., 2 7-in. do., 6 15-c.m. do. (Krupp), 3 M., 3 l.	..	1865	..	10·0	350	..
cr.	**Shadie**	1815	226 0	35 0	steel	14 0	2	2500 ind.	6 15-c.m. B.L.R. (Krupp)	7 f. tu. or l. car	Bldng.	..	17·0	..	..
to.g.b.	**Shahin-deria** . . .	450	200 0	23 0	„	9 0	2	3500 ind.	6 5·7-in. Q.F. . .	4 l. car.	1890	..	21·0	..	..
sl.	**Sinope**	800	174 10	30 6	wood	15 2	1	150	2 6-in. B.L.R. (Krupp), 2 12-c.m. do., 2 M.	..	1859–89	..	10·0	..	..
g.v.	**Uthared**	609	173 6	26 7	„	12 10	1	160	2 4¾-in. B.L.R. (Krupp) .	..	1863–85	..	10·00	120	..
„	**Zuhaf**	609	173 6	26 7	„	12 10	1	160	4 4¾-in. B.L.R. (Krupp), 6 M.	..	1862–85	..	10·00	120	..

27 *Despatch Vessels and Yachts.*—Ainaly-Kawak (Paddle), Arcadia, Candia, Chania, Esser-i-Djidid, Esser-i-Neiseret, Faiz-i-Bahri, Fevaid, Ismail, Izzedin (Paddle), Mouassir, Peih-i-Tidjaret, Rethimo, Rhodos (Paddle), Sahir, Seyar, Seyar-i-Derja Soolhie, Stamboul (Paddle), Sultanieh, Surreya, Syrat (Paddle), Thalia of 194 tons to 1512 tons displacement, and 50 HP. to 800 HP. About one-half of these vessels are built of wood.

4 *Gunboats.*—Akha, Frat, Nedsim-efshan, Shefket-Numa, and Shat, of 200 tons displacement and 60 HP., and about 10 knots speed.

Torpedo-boats.—In addition to the torpedo-gunboats given in the alphabetical list of unarmoured vessels, there are 23 first-class torpedo-boats built and building, 16 of about 88 tons and of 21 to 22 knots speed, and the remaining seven of about 43 tons displacement and 19 knots speed.

There are also, in addition to the vessels named in the lists, screw and paddle transports and store ships, harbour ships and vessels, tugs, &c., &c.

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UNITED STATES.—Armoured Ships.

t., turret ship; *c.l.b.*, *t.*, coast-line battleship, turret; *a.c.*, armoured cruiser; *c.s.*, *t.*, coast-service turret ship; *to. ram*, torpedo ram; f. tu., or l. car., fixed tube, or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour.		Backing.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament.		Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
					Belt.	Turret or Battery.	Deck Plating.				Guns.	Fish Torpedo Dis-chargers					
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
c.s., t.	**Ajax** (1 turret) (iron)	2100	226 4	43 7	5	11	..	13 9	1	340	2 15-in. 19-ton smooth-bores .	..	1864	125,000	6·00	160	..
to. ram	**Alarm** . .(iron)	720	172 6	29 3	4 (on traverse)	..	16	11 2	1	800	1 6-in. B.L.R., 2 Q.F., 1 M.. .	..	1873	..	11·00	..	..
c.s., t.	**Amphitrite** (2 t.) . (iron)	3815	249 4	55 9	7	11½	.. 2″	14 3	2	1600	4 10½ 25-ton B.L.R., 6 Q.F., 4 M.	..	1885 (rebuilt)	..	12·00	300	1800
c.s., t.	**Camanche** (1 t.) (iron)	1875	200 2	45 11	5	11	..	11 6	1	350	2 15-in. 19-ton smooth-bores .	..	1863	125,000	6·00	160	..
c.s., t.	**Canonicus** (1 t.) (iron)	2100	226 4	43 7	5	11	..	13 9	1	320	2 15-in. 19-ton smooth-bores .	..	1864	125,000	6·00	160	..
c.s., t.	**Catskill** (1 t.) (iron)	1875	200 2	45 11	5	11	..	11 6	1	350	2 15-in. 19-ton smooth-bores .	..	1863	..	6·00	150	..
c.s. ram	New ship	2050	243 0	43 6	6	.. 18 C.T.	.. 6″–3″	15 0	2	4800	4 6-pdr. Q.F.	Nil	Bldng.	186,000	17·00	..	..
c.l.b., t.	**Indiana** . (steel)	10,231	348 0	69 3	18 C. T. 10	17 turret 6 to 8 in. small turrets	.. 3″	24 0	2	9000	4 13-in. B.L.R., 8 8-in. do., 4 6-in. do., 16 6-pdr. Q.F., 4 1-pdr. do., and 4 M.	7 f. tu. or l.car	Bldng.	604,000	16·0	400 1800	3600 16,000
to. ram	**Intrepid** . .(iron)	1123	170 7	36 0	5	..	14	11 10	2	800	.. ..	..	1874	..	9·00	..	..
c.s., t.	**Jason** (1 t.) (iron)	1875	200 2	45 11	5	11	..	11 6	1	350	2 15-in. 19-ton smooth-bores .	..	1864	..	6·00	150	..
c.s., t.	**Lehigh** (1 t.) (iron)	1875	200 2	45 11	5	11	..	11 6	1	350	2 15-in. 19-ton smooth-bores .	..	1864	..	6·00	150	..
c.s., t.	**Mahopac** (1 t.) (iron)	2100	226 4	43 7	5	10	..	13 9	1	320	2 15-in. 19-ton smooth-bores .	..	1865	..	6·00	160	..
a.c.	New ships (2 in number) (steel)	8150	380 6	64 10	5 in way of machinery	10 C.T. 7	.. 6″–3″	23 3½	2	16,500	6 8-in. B L.R., 12 4-in. Q.F., 8 6-pdr. do., 4 1-pdr. do., 4 M.	..	Proposed to be built	..	20·0	1150	12,000

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a.c., t.	**Maine** (2 t.) (steel)	6648	310	0	57	0	12	12	.. 2″	21	6	2	9000	4 10-in. 26-ton B.L.R., 6 6-in. do., 12 6-pdr. Q.F., 6 1-pdr. do., 4 M.	7 f. tu. or l.car.	1800	517,600	17·00	850	7000
c.s., t.	**Manhattan** (1 t.) (iron)	2100	226	4	43	7	5	10	..	13	9	1	320	2 15-in. 19-ton smooth-bores	..	1865	..	6·00	160	..
c.l.b., t.	**Massachusetts** (steel)	10,231	348	0	69	3	18 C. T. 10	17 turret 8 to 6 in. small turret	.. 3″	24	0	2	9000	4 13-in. B.L.R., 8 8-in. do., 4 6-in. do., 16 6-pdr. Q.F., 4 1-pdr. do., 4 M.	7 f. tu. or l.car	Bldng.	604,000	16·0	400 1800	3600 16,000
c.s., t.	**Miantonomoh** (2 t.) (iron)	3815	249	4	55	9	7	11½	8 2″	14	3	2	1600	4 10½-in. 25-ton B.L.R., 4 Q.F., 4 M.	..	1885 (rebuilt)	272,000	10·50	330	1800
c.s., t.	**Monadnock** (2 t.) (iron)	3815	249	4	55	9	7	11½	8 2″	14	3	2	1600	4 10½-in. 25-ton B.L.R., 4 Q.F., 4 M., 2 l.	..	1885 (rebuilt)	272,000	12·00	330	1800
c.s., t.	**Montauk** (1 t.) (iron)	1875	200	2	45	11	5	11	..	11	6	1	350	2 15-in. 19-ton smooth-bores	..	1864	..	5·50	160	..
c.s., t.	**Monterey** (steel)	4048	250	0	59	0	13	14, 10 conning tower	.. 6″–3″	14	6	2	5400	2 12-in. 45-ton B.L.R., 2 10-in. do., 6 6-pdr. Q.F., 4 1-pdr. do., 4 M.	..	1891	..	16·00	..	..
c.s., t.	**Nahant** (1 t.) (iron)	1875	200	2	45	11	5	11	..	11	6	1	350	2 15-in. 19-ton smooth-bores	..	1863	..	6·00	160	..
c.s., t.	**Nantucket** (1 t.) (iron)	1875	200	2	45	11	5	11	..	11	6	1	350	2 15-in. 19-ton smooth-bores	..	1863	..	5·60	160	..
a.c.	**New York** (steel)	8150	380	6	64	10	5 in way of machinery.	10 barbette C.T. 7	.. 6″–3″	23	3½	2	16,500	6 8-in. B.L.R., 12 4-in. Q.F., 8 6-pdr. do., 4 1-pdr. 4 M.	6 f. tu. or l.car	1891	597,000	20·00	750 1150	13,500
c.l.b., t.	**Oregon** (steel)	10,231	348	0	69	3	18 C. T. 10	17 turret 8 to 6 in. small turret	.. 3″	24	0	2	9000	4 13-in. B.L.R., 8 8-in. do., 4 6-in. do., 16 6-pdr. Q.F., 4 1-pdr. do., 4 M.	7 f. tu. or l.car	Bldng.	636,000	16·0	400 1800	3600 16,000
c.s., t.	**Passaic** (1 t.) (iron)	1875	200	2	45	11	5	11	..	11	6	1	350	2 15-in. 19-ton smooth-bores	..	1863	..	6·00	160	..
c.s., t.	**Puritan** (2 t.) (iron)	6060	280	0	60	0	12	11½	.. 2″	18	1	2	3700	4 10½-in. 25-ton B.L.R., 4 Q.F., 8 M.	..	1885 (rebuilt)	..	13·00	580	..
c.s., t.	**Terror** (2 t.) (iron)	3815	249	4	55	9	7	11½	8 1½″	14	3	2	1600	4 10½-in. 25-ton B.L.R., 2 Q.F., 4 M.	..	1885 (rebuilt)	206,800	12·00	330	1800
t.	**Texas** (2 t.) (steel)	6300	290	0	64	0	12	12	.. 3″	22	6	2	8600	2 12-in. 46-ton B.L.R., 6 6-in. do., 12 6-pdr. Q.F., 4 1-pdr. do., 4 M.	6 f. tu. or l car	1891	495,000	17·00	850	7000
c.s., t.	**Wyandotte** (1 t.) (iron)	2100	225	0	43	7	5	10	..	13	6	1	320	2 15-in. 19-ton smooth-bores	..	1864	..	6·00	160	..

Two new battleships (Indiana type) are proposed to be built.

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UNITED STATES.—Unarmoured Ships.

corv., corvette; *cr.*, cruiser; *d.v.*, despatch-vessel; *g.v.*, gun-vessel; *sl.*, sloop; P., deck protected throughout; *p.p.*, partial deck protected, with thickness of plating under; *f. tu.* or *l. car.*, fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
sl.	Adams . . .	1375	183 9	36 0	wood	14 2	1	800	1 8-in. 8-ton smooth-bore, 4 9-in. 4-ton do., 1 60-pdr. B.L.R., 2 l., 2 M.	..	1874	..	9·00	140	..
g.v.	Alert	1020	173 10	31 10	iron	12 10	1	656	1 8-in. 7¾-ton smooth-bore, 2 9-in. 4-ton do., 1 60-pdr. B.L.R., 1 M., 2 l.	..	1874	..	9·00	140	..
sl.	Alliance . . .	1375	183 9	36 0	wood	14 2	1	774	1 8-in. 8-ton M.L.R., 4 9-in. 4-ton do., 1 60-pdr. B.L.R., 2 l., 2 M.	..	1875	..	9·00	130	..
cr.	Atlanta . . *p.p.* ⅝″	3189	270 0	42 0	steel	17 0	1	3511	2 8-in. 11¾-ton B.L.R., 6 6-in. 5-ton do., 6 Q.F., 6 M.	..	1884	123,600	16·33	400	5000
„	Baltimore . P. 4″–2½″	4413	315 0	48 6	„	19 6	2	10750	2 8-in. 11¾-ton B.L.R., 6 6-in. 5-ton do., 4 6-pdr. Q.F., 2 1-pdr. do., 7 M.	5 f. tu. or l.car	1888	210,000	19·00	900	12000
„	Bennington (was Gun-boat No. 3)	1750	230 0	36 0	„	14 0	2	3400	6 6-in. B.L.R., 4 6-pdr. Q.F., 5 M. . .	2 l. car	1890	98,000	17·00	400	9000
„	Boston . . *p.p.* ⅝″	3189	270 0	42 0	„	17 0	1	3780	2 8-in. 11¾-ton B.L.R., 6 6-in. 5-ton do., 6 Q.F., 6 M.	..	1884	123,200	15·00	780	5000
„	Charleston . P. ¾″	3730	300 0	46 2	„	18 6	2	7500	2 8-in. B.L.R., 8 6-in. 5-ton do., 4 6-pdr. Q.F., 2 3-pdr. do., 8 M.	4 f. tu. or l.car	1888	..	18·00	800	..
„	Chicago . . *p.p.* ⅝″	4500	315 0	48 2	„	19 0	2	5000	4 8-in. B.L.R., 8 6-in. do., 2 5-in. do., 4 Q.F., 8 M.	..	1885	177,800	15·00	940	6000
„	Cincinnati . P. 2½″	3893	300 0	42 0	„	18 0	2	10,000	1 6-in. B.L.R., 10 4-in. do., 2 6-pdr. Q.F., 2 3-pdr. do., 4 M.	6 f. tu. or l.car	Building	220,000	19·00	..	..
„	Concord (was Gunboat No. 4)	1700	230 0	36 0	„	14 0	2	3400	6 6-in. B.L.R., 4 6-pdr. Q.F., 5 M. . .	2 l. car	1890	98,000	17·00	400	9000
„	Detroit (was No. 10) .	2000	257 0	37 0	„	14 6	2	5400	2 6-in. B.L.R., 4 3¼-in. Q.F., 4 6-pdr. do., 3 3-pdr. do., 2 M.	6 f. tu. or l.car	1891	..	18·00	435	..
d.v.	Dolphin . . .	1485	239 6	31 10	„	14 2	1	2300	2 4-in. Q.F., 2 other do., 6 M. . . .	..	1884	61,000	15·50	310	..

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sl.	**Enterprise** . .	1375	183 9	36 0	wood	14	2	1	800	1 8-in. 8-ton smooth-bore, 4 9-in. 4-ton do., 1 60-pdr. B.L.R., 9 l., 1 M.	..	1874	..	10·00	140	..
,,	**Essex.** . . .	1375	183 9	36 0	,,	14	2	1	800	1 8-in. 8-ton smooth-bore, 4 9-in. 4-ton do., 1 60-pdr. B.L.R., 2 l., 2 M.	..	1874	..	10·00	140	..
g.v.	Gunboat No. 6 . .	1050	190 0	32 0	steel	12	2	2	1600	8 4-in. Q.F., 4 6-pdr. do., 2 1-pdr. do., 2 M.	..	Building	..	14·00	..	..
corr.	**Iroquois** . . .	1575	200 2	32 10	wood	15	1	1	813	1 11-in. 7¾-ton smooth-bore, 2 8-in. 4-ton do., 1 60-pdr. B.L.R., 2 l., 2 M.	..	1858	..	8·00	128	..
,,	**Kearsarge** . . .	1550	196 10	32 10	,,	15	9	1	822	2 8-in. smooth-bores, 4 9-in. do., 1 60-pdr. B.L.R., 3 l., 1 M.	..	1861	..	9·00	165	..
cr.	**Lancaster** . . .	3250	236 3	45 11	,,	19	1	1	2000	1 8-in. B.L.R., 2 6-in. do., 2 4-in. do., 10 Q.F., 4 M.	..	1859	..	9·60	288	..
g.v.	**Machias** . . .	1050	190 0	32 0	steel	12	2	2	1600	8 4-in. Q.F., 4 6-pdr. do., 2 1-pdr. do., 2 M.	..	1891	..	14·00	..	..
corv.	**Marion** . . .	1900	216 6	37 0	,,	16	5	1	1172	6 9-in. 4-ton smooth-bores, 1 8-in. 8-ton M.L.R., 1 60-pdr. B.L.R., 3 l., 3 M.	..	1873	..	11·00	156	..
,,	**Mohican** . . .	1900	216 6	37 0	,,	16	5	1	1172	6 9-in. 4-ton smooth-bores, 1 8-in. 8-ton do., 1 60-pdr. B.L.R., 3 l., 3 M.	..	1882	..	11·00	160	..
cr.	**Montgomery** (was No. 9)	2000	257 0	37 0	,,	14	6	2	5400	2 6-in. B.L.R., 4 3¾-in. Q.F., 4 6-pdr. do., 3 3-pdr. do., 2 M.	6 f. tu. or l.car	1891	..	18·00	435	..
,,	**Newark** . . P. 3″–2″	4083	310 0	49 0	,,	18	9	2	8500	12 6-in. 5-ton B.L.R., 4 6-pdr. Q.F., 9 M. .	6 f. tu. or l.car	1890	250,000	19·00	850	10,500
to.cr.	Number 1 . . .	750	260 0	27 0	,,	8	4	2	6000	3 4-in. Q.F., 4 6-pdr. do., 4 1-pdr. do., 2 M.	..	Building	..	23·00	..	..
cr.	Number 6 . . P. 4¾″–2″	5500	340 0	53 0	steel barbette 4 in.	21	6	2	13,500	4 8-in B.L.R., 10 5-in. Q.F., 14 6-pdr. do., 6 3-pdr. do., 4 M.	6 f. tu. or l.car	Building	359,200	20·00	1300	13,000
,,	Number 11 (as Detroit) .	2000	257 0	37 0	steel	14	6	2	5400	2 6-in. B.L.R., 4 3¾-in. Q.F., 4 6-pdr. do., 3 3-pdr. do., 2 M.	6 f. tu. or l.car	1892	122,500	18·00	..	..
,,	Number 12 (“Commerce Destroyer”) P. 4″–2½″	7475	412 0	58 2	,,	24	0	3	21,000	1 8-in. B.L.R., 2 6-in. do., 8 4-in. Q.F., 12 6-pdr. do., 8 1-pdr. do., 4 M.	5 f. tu. or l.car	Building	545,000	22·00	750 2000*	9,800 26,240
,,	Number 13 (“Commerce Destroyer”) P. 4″–2½″	7475	412 0	58 2	,,	24	0	3	21,000	1 8-in. B.L.R., 2 6-in. do., 8 4-in. Q.F., 12 6-pdr. do., 8 1-pdr. do., 4 M.	5 f. tu. or l.car	Building	538,000	22·00	750 2000*	9,800 26,240

* Quantity that can be stowed.

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UNITED STATES.—Unarmoured Ships—*continued.*

corv., corvette; *cr.*, cruiser; *fr.cr.*, frigate-built cruiser; *g.v.*, gun-vessel; *sl.*, sloop; P., deck protected throughout; *p.p.*, partial deck protected, with thickness of deck plating under; f. tu. or l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
cr.	Petrel (was Gun-boat No. 2)	890	175 0	31 0	steel	11 7	1	1300	4 6-in. B.L.R., 3 3-pdr. Q.F., 4 M.	..	1888	50,000	13·0	160	..
"	Philadelphia . P. 4″–2½″	4413	315 0	48 6	"	19 3	2	10,500	12 6-in. B.L.R., 4 6-pdr. Q.F., 4 1-pdr. do., 7 M.	5 f. tu. or l.car	1889	265,000	19·0	850	..
"	Raleigh . . P. 2½″	3893	300 0	42 6	"	18 0	2	10,000	1 6-in. B.L.R., 10 4-in. do., 2 6-pdr. Q.F., 2 3-pdr. do., 4 M.	..	1892	..	19·00	..	..
g.v.	Ranger (Surveying) .	1020	173 10	31 10	iron	12 10	1	656	1 60-pdr. M.L. Parrott, 1 M.	..	1874	..	8·00	127	..
fr. cr.	Richmond . .	2700	226 4	42 7	wood	17 4	1	1078	12 9-in. 4-ton smooth-bore, 1 8-in. 8-ton do., 1 60-pdr. M.L.R., 2 l., and 6 M.	..	1860	..	9·00	290	..
cr.	San Francisco . P. 3″–2″	4083	310 0	49 2	steel	18 9	2	10,500	12 6-in. B.L.R., 4 6-pdr. Q.F., 7 M.	6 f.tu. or l.car	1889	270,000	19·50	850	10,500
"	Vesuvius (Dynamite Gun Cruiser)	725	246 0	26 6	"	9 0	2	3200	3 dynamite guns, 10½ in. cal., 3 3-pdr. Q.F.	..	1888	70,000	20·00	28	..
g.v.	Yantic . . .	900	180 5	29 6	wood	12 2	1	670	1 8-in. 8-ton smooth-bore, 2 9-in. 4-ton do., 1 60-pdr. B.L.R., 2 l. 1 M.	..	1878	..	8·00	125	..
cr.	York Town (was Gun-boat No. 1)	1700	230 0	36 0	steel	14 0	2	3400	6 6-in. B.L.R., 4 6-pdr. Q.F., 5 M.	2 l. car.	1888	98,000	16·0	400	9000

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Paddle steamers.—Michigan (685 tons and 300 horse-power), Monocacy (1370 tons and 850 horse-power), Tallapoosa (1270 tons and 1100 horse-power, now ordered to be sold).

Steamers (fourth-rate).—Despatch (560 tons, 402 I.HP.); Palos (420 tons and 350 horse-power); Fortune, Leyden, Mayflower, Pinta, Speedwell, Standish, Triana (each 450 tons and 440 I.HP.); Catalpa (300 tons), Cohasset (450 tons), Rocket and Triton.

Torpedo-boats.—Three torpedo-boats, one 154 feet long, 15 feet wide, 140 tons displacement, 2500 I.HP., and 24 knots speed; one 138 feet long, 15 feet wide, 116 tons displacement, 1720 horse-power, and 22 knots speed; and one of 31 tons displacement and 18 knots speed.

Submarine torpedo-boats.—Nautilus, built in London, and The Peacemaker, built in America.

Surveying ships, training ships, store ships, harbour ships, tugs, &c., are not included in the above lists.

The following wooden vessels are unfit for further cruising service :—

Name.	Class.	Tons.	When Launched.
Nipsic	Sloop . .	1375	1878
Omaha	Cruiser . .	2400	1868
Pensacola	Cruiser . .	3000	1859
Swatara	Corvette .	1900	1873

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URUGUAY.

Gunboats.—General Artiga, 274 tons, 520 I.HP., 12½ knots speed, 2 12-c.m. B.L.R. (30 calibres, Krupp), 2 M.

General Rivera, 300 tons, 12 knots speed, and having an armament of 1 15-c.m. B.L.R., 1 6-c.m. ditto, and the General Jaurez (was Tactique).

Also an iron steamer of 400 tons displacement, the Malvinias, built at Elbing in 1882.

VENEZUELA.

A small *Steamer*, Augusta, of iron, launched in 1884.

It is understood that four gunboats are in course of construction in England.

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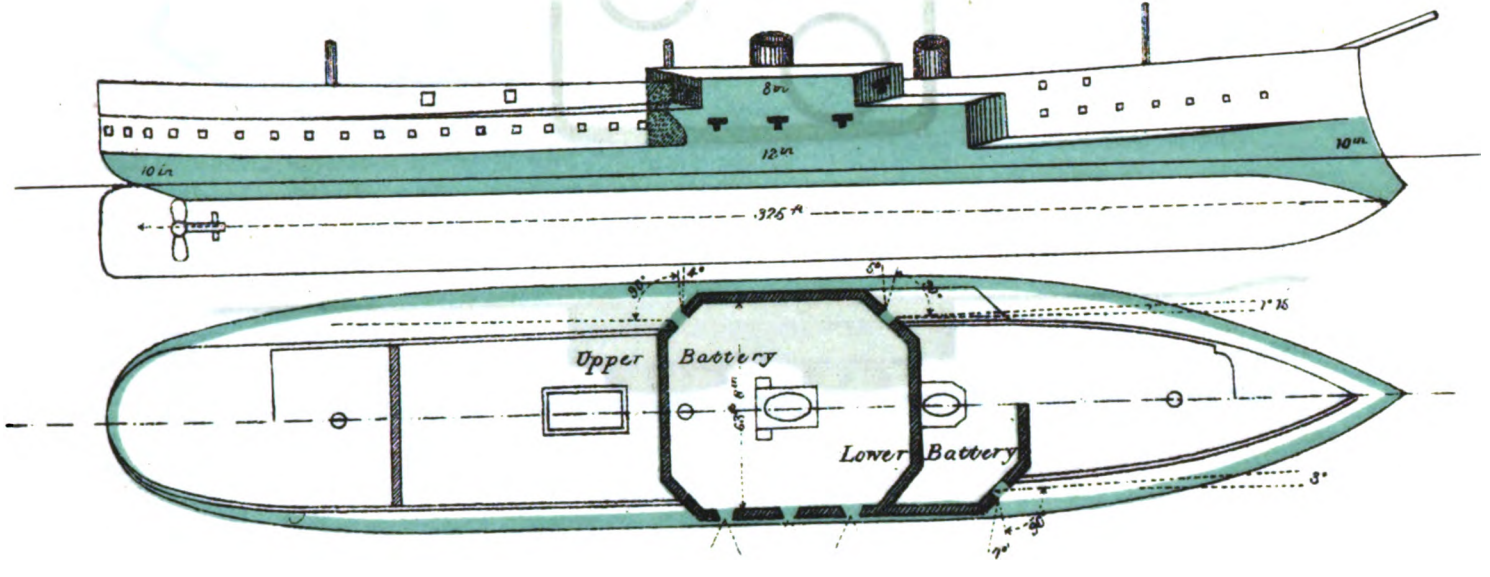
"Alexandra"



HANHART LITH.

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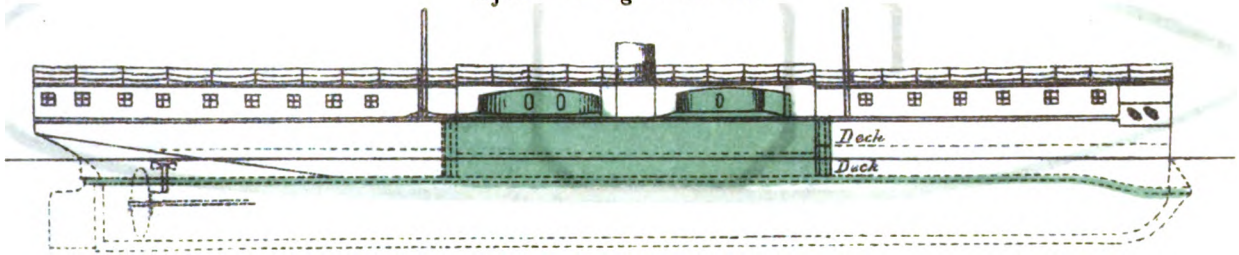
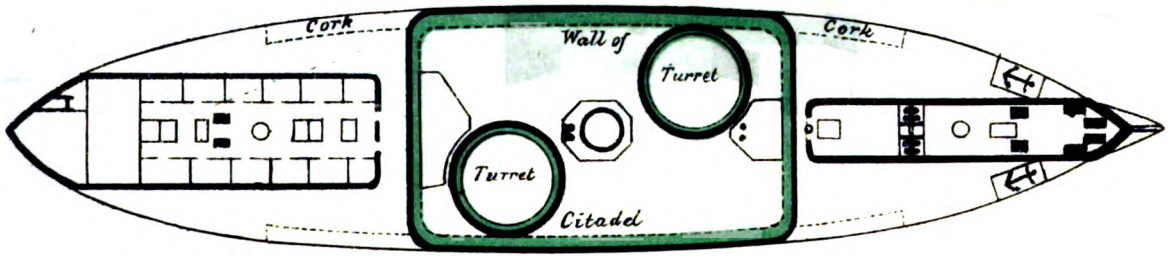
BRITISH SHIPS.

"Ajax" & "Agamemnon"





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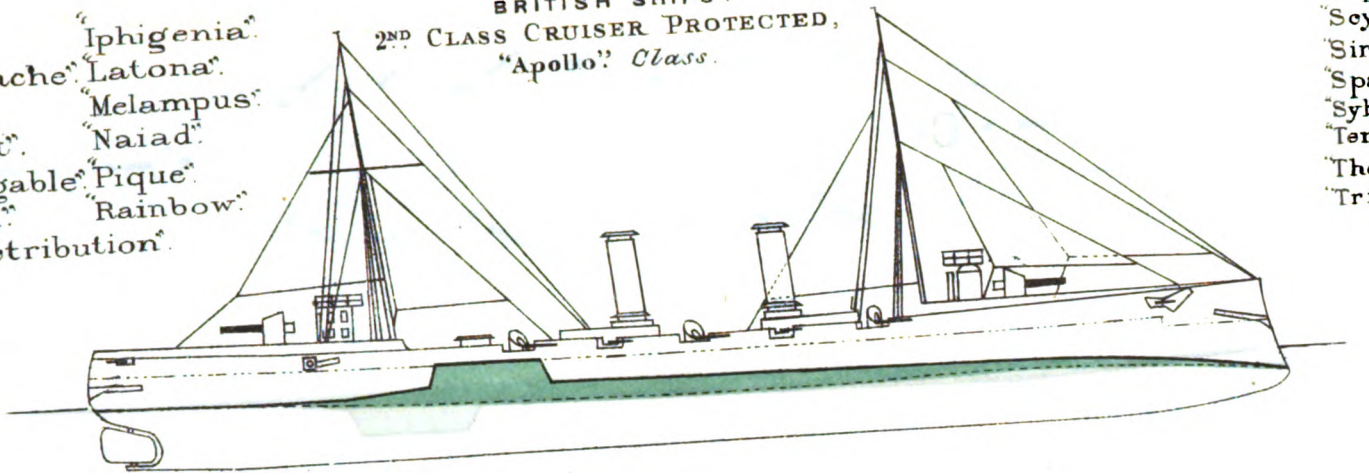
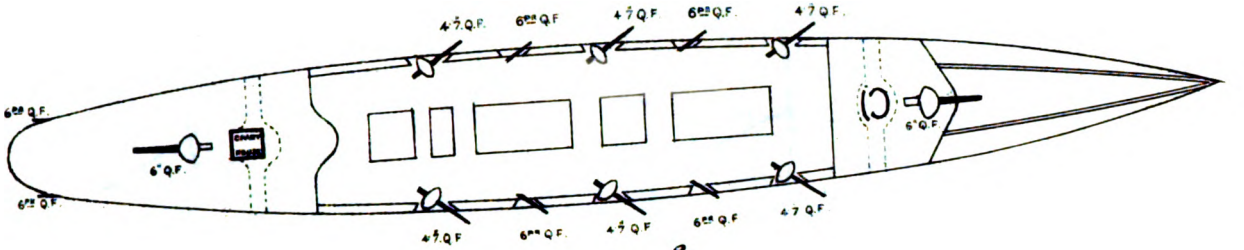
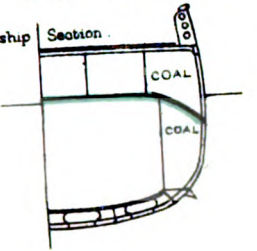
BRITISH SHIPS.
2ND CLASS CRUISER PROTECTED,
"Apollo" *Class.*

"Æolus".
"Andromache".
"Apollo".
"Brilliant".
"Indefatigable".
"Intrepid".
"Retribution".
"Iphigenia".
"Latona".
"Melampus".
"Naiad".
"Pique".
"Rainbow".

"Sappho".
"Scylla".
"Sirius".
"Spartan".
"Sybille".
"Terpsichore".
"Thetis".
"Tribune".







Special Scale

HANHART LITH.

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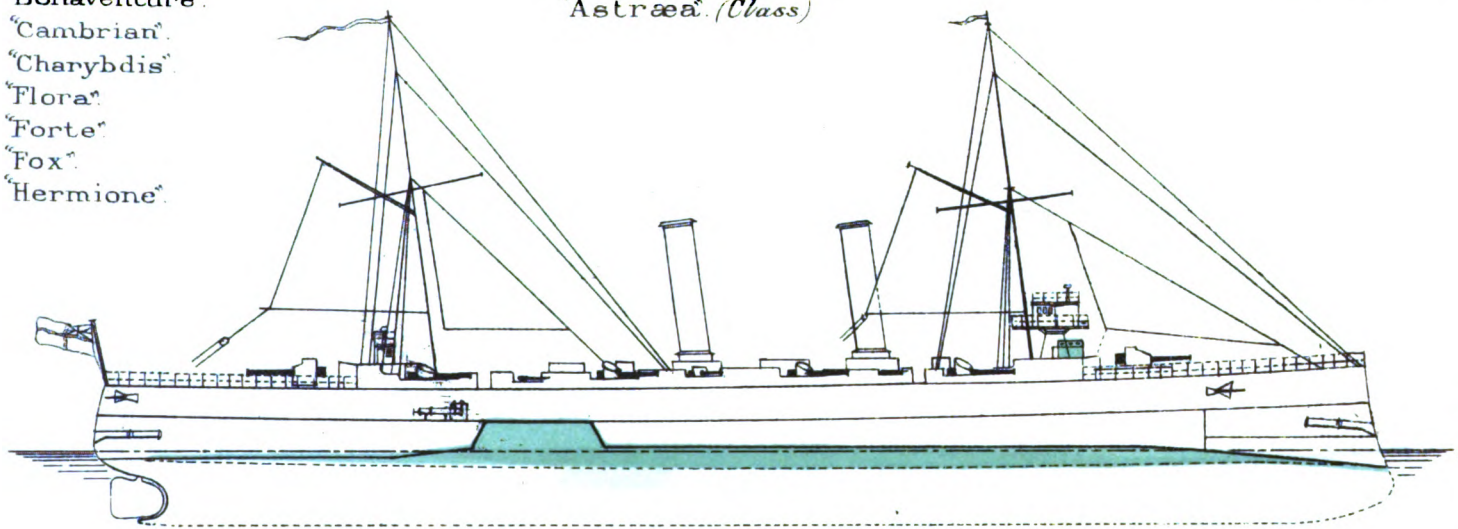
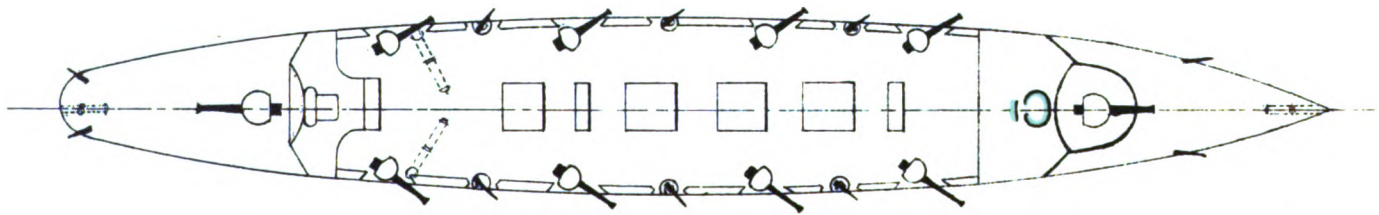
"Astræa"
"Bonaventure"
"Cambrian"
"Charybdis"
"Flora"
"Forte"
"Fox"
"Hermione"

2nd CLASS PROTECTED CRUISERS.

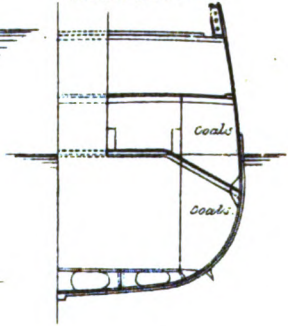
BRITISH SHIPS.

"Astræa" (Class)





On Special Scale
MIDSHIP SECTION



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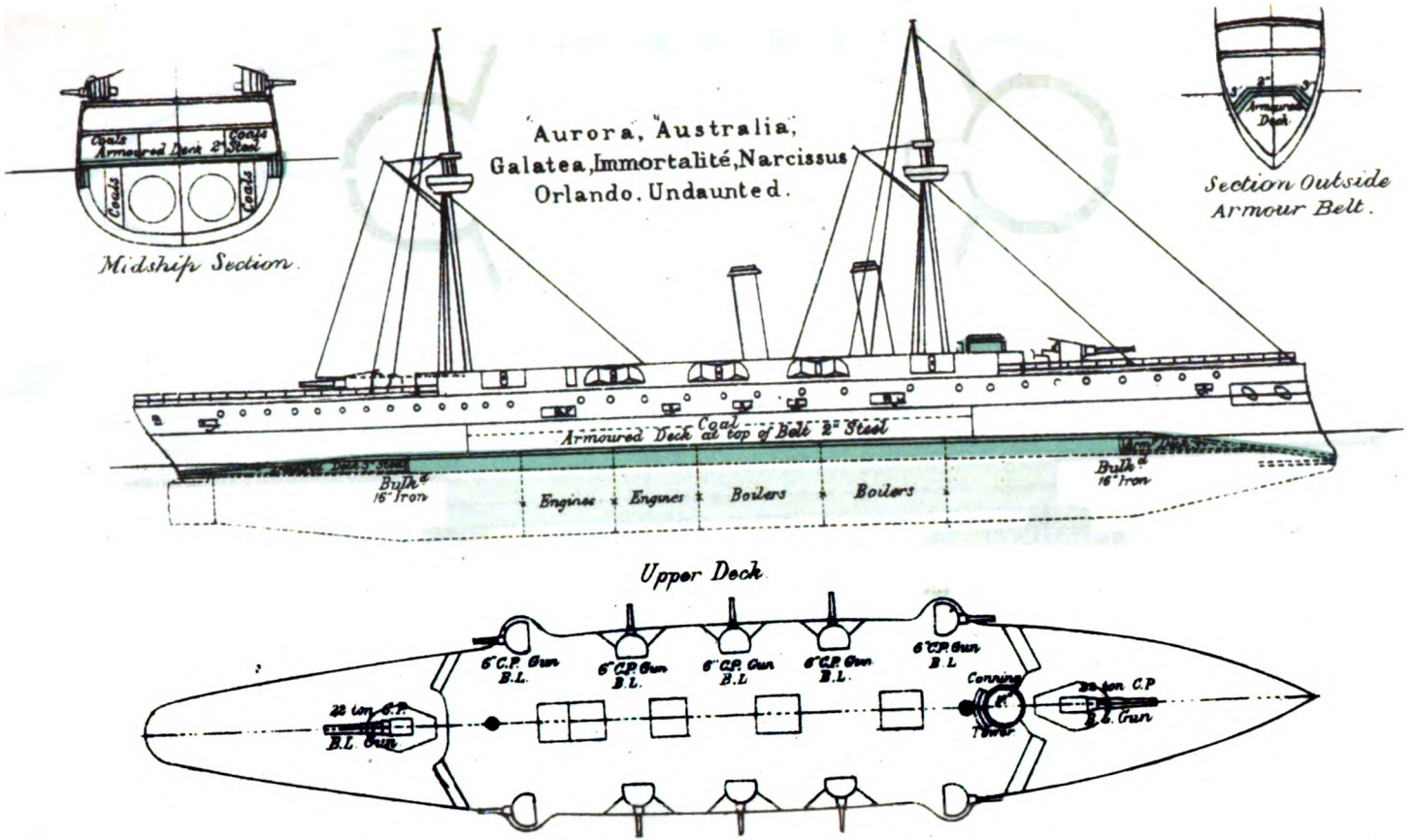
BRITISH SHIPS.



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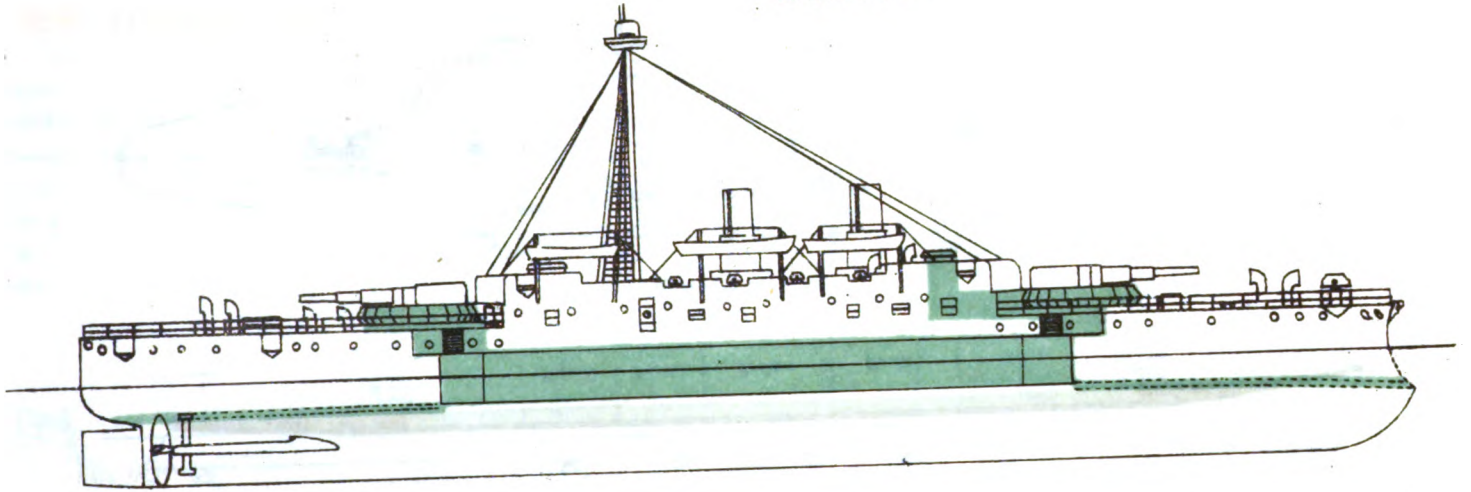
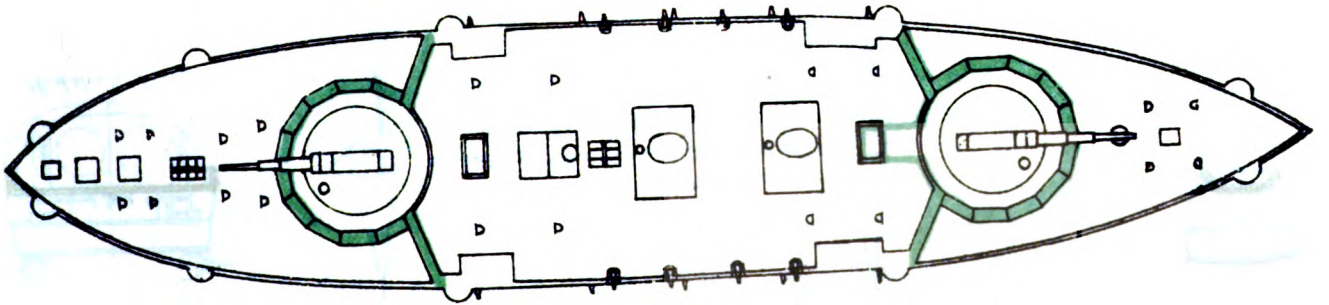
BRITISH SHIPS.

"Benbow".



Spar Deck.



HANHART LITH.

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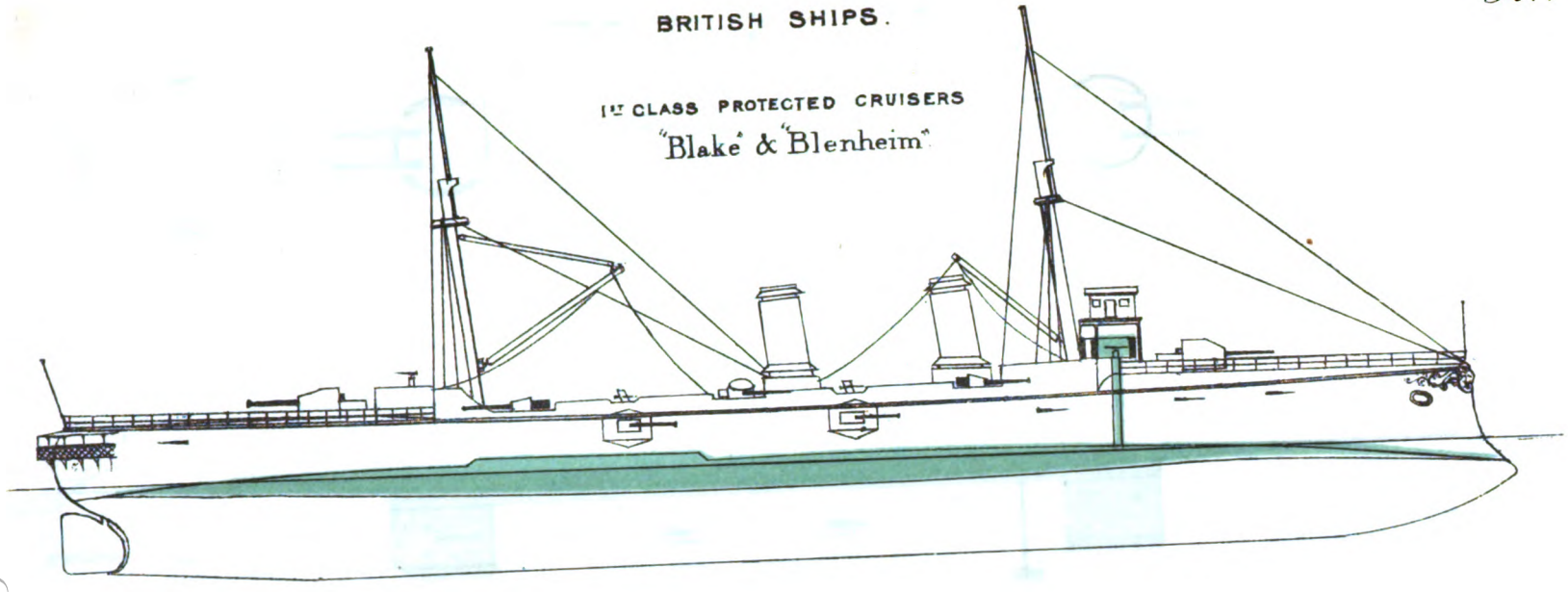
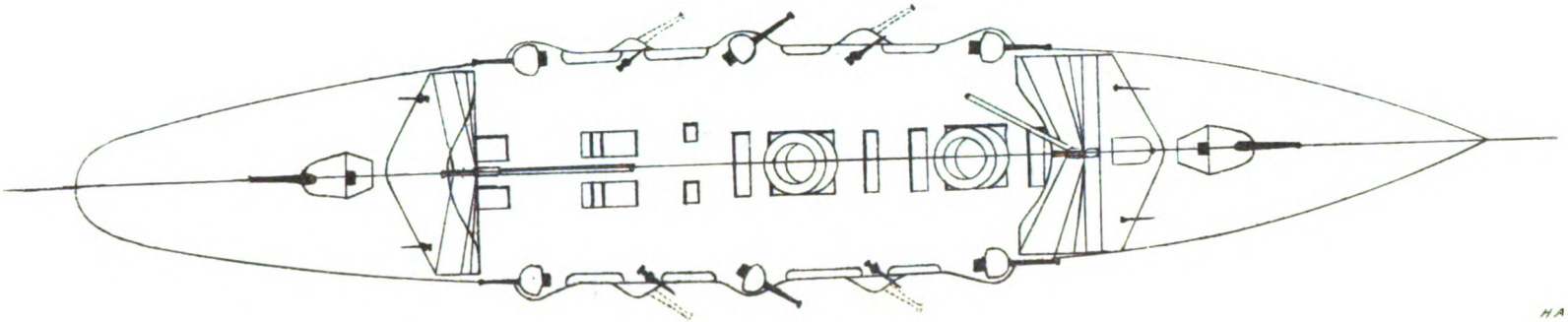
BRITISH SHIPS.

1st CLASS PROTECTED CRUISERS
"Blake" & "Blenheim"





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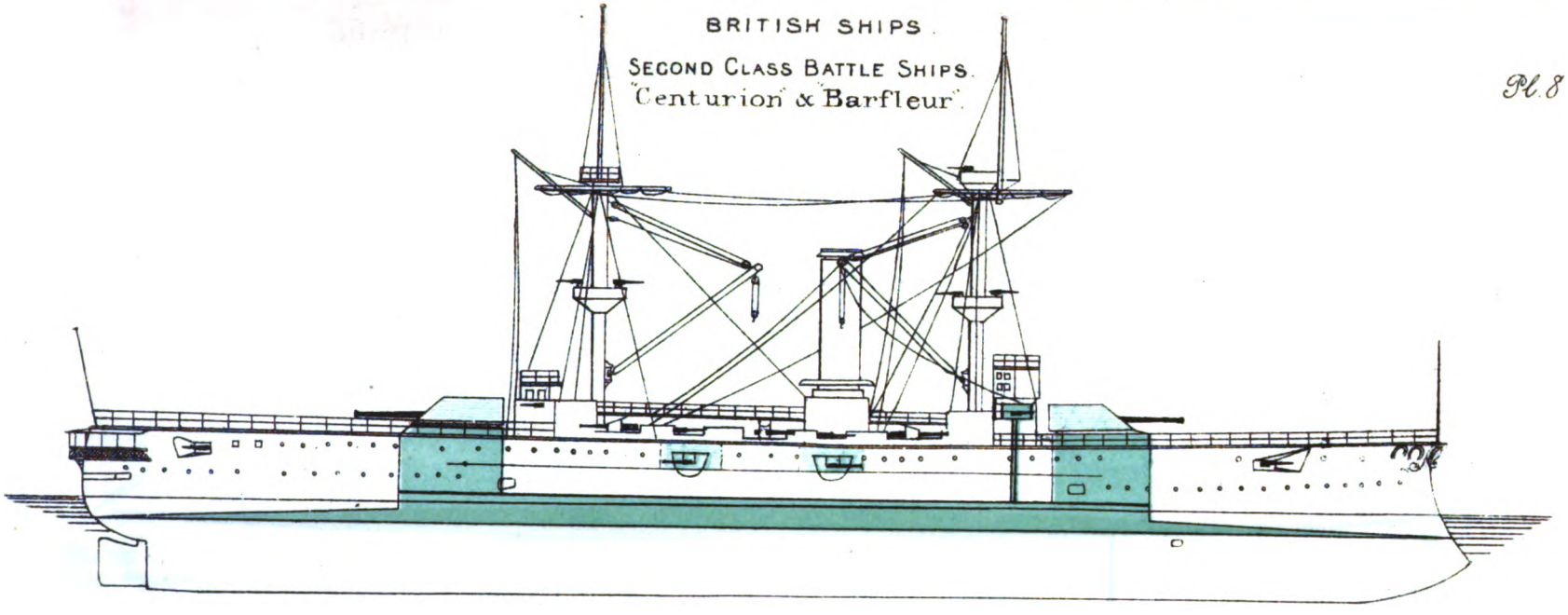
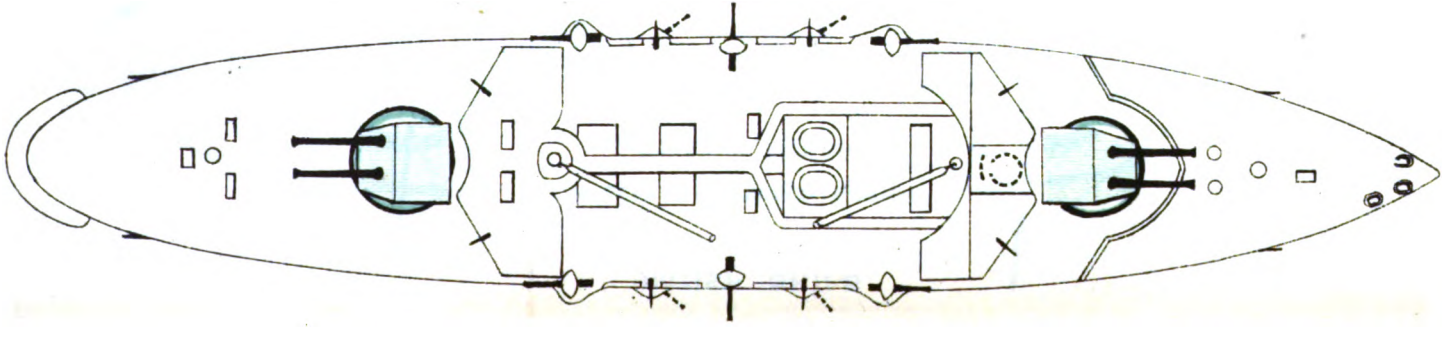
BRITISH SHIPS.

SECOND CLASS BATTLE SHIPS.

"Centurion" & "Barfleur".

Pl. 8





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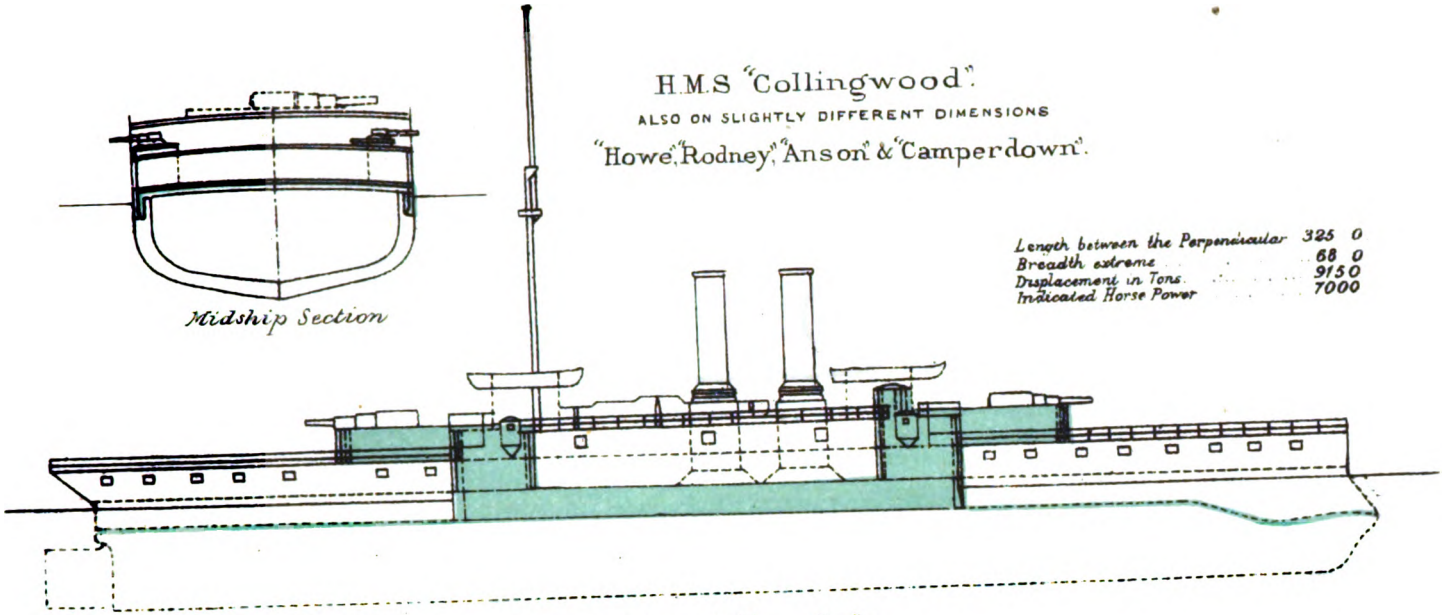
H.M.S "Collingwood".

ALSO ON SLIGHTLY DIFFERENT DIMENSIONS

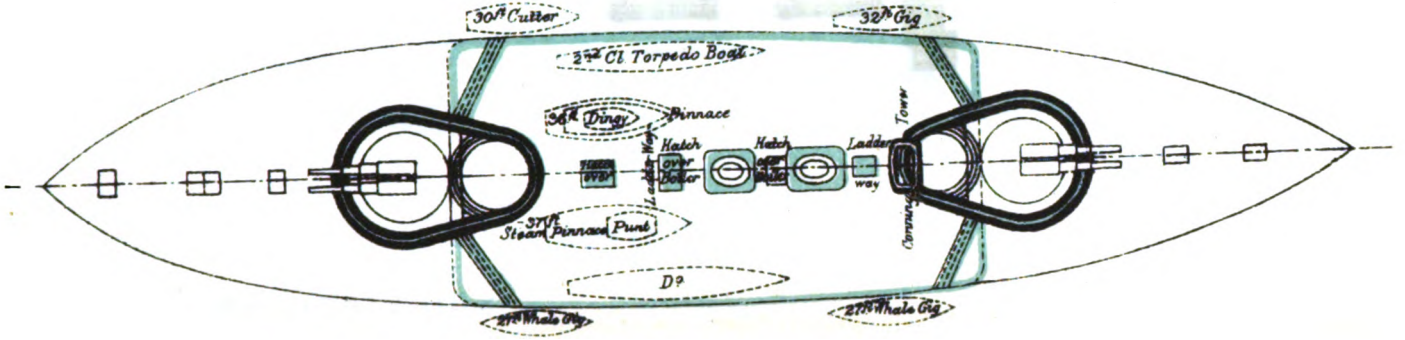
"Howe", "Rodney", "Anson" & "Camperdown".

Length between the Perpendicular	325 0
Breadth extreme	68 0
Displacement in Tons	9150
Indicated Horse Power	7000

Midship Section



Plan of Spar & Upper Decks.



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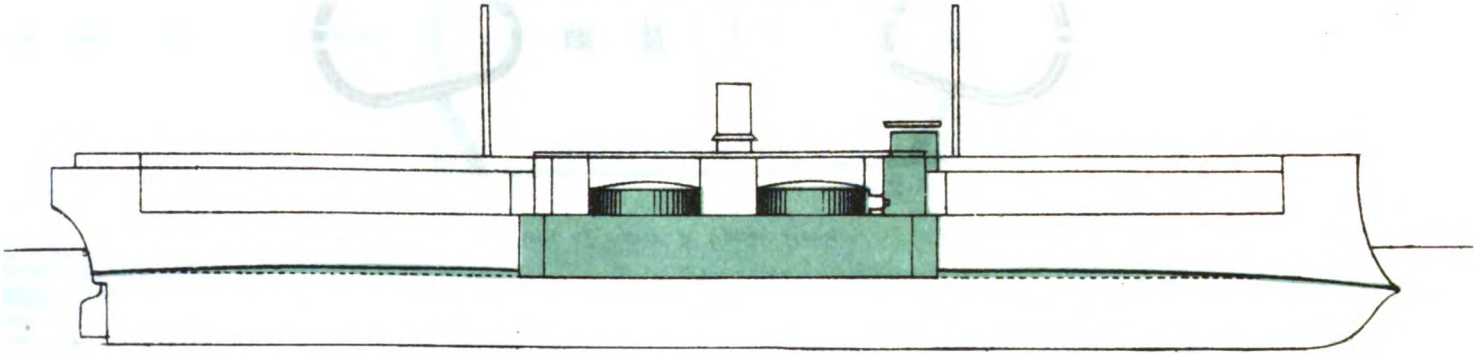
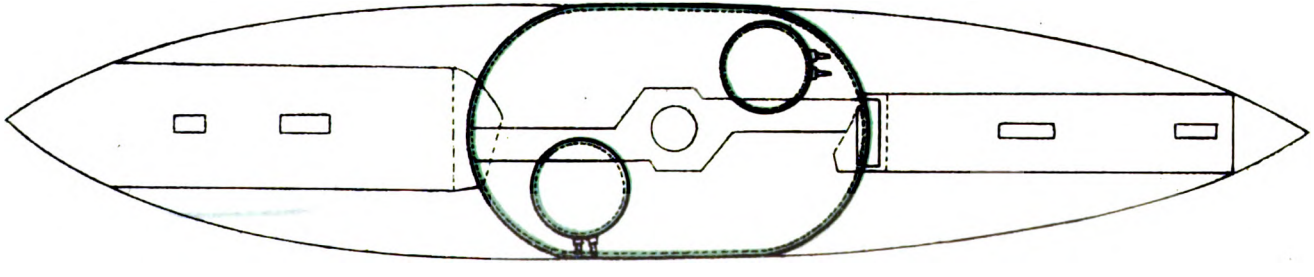
BRITISH SHIPS.

"Colossus" & "Edinburgh."





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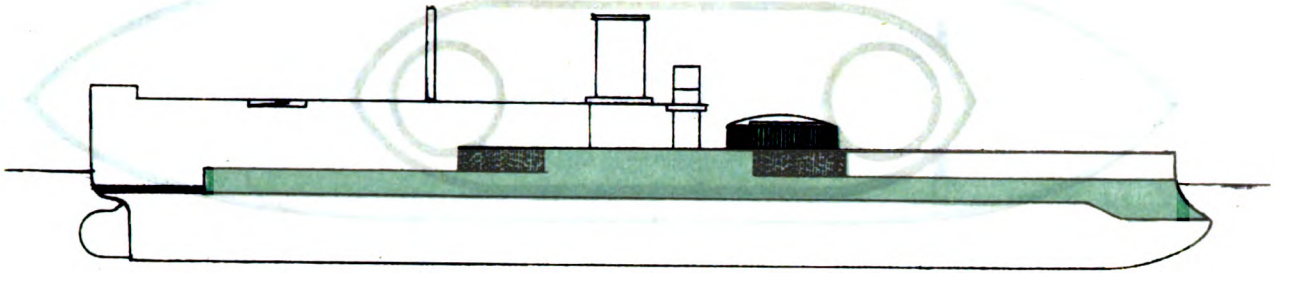
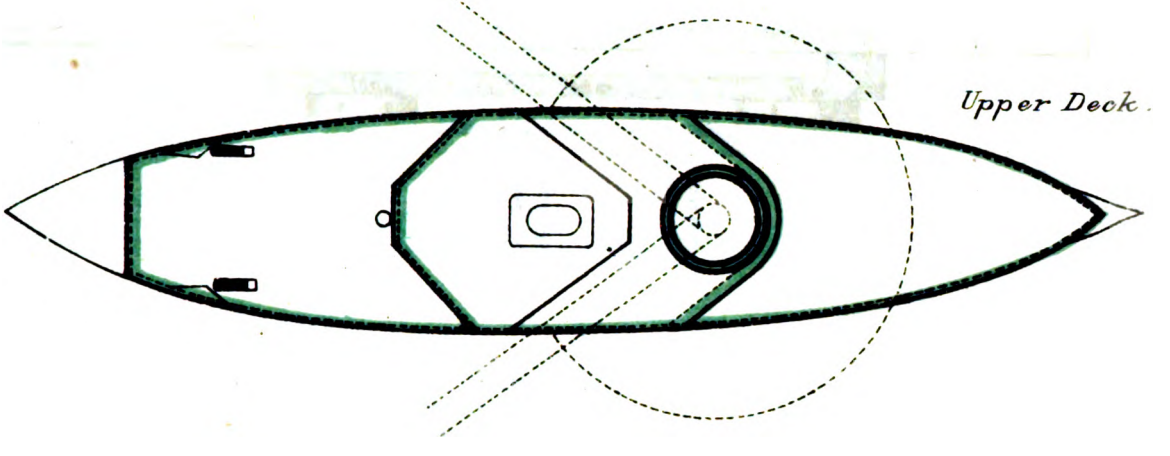
"Conqueror" & "Hero".





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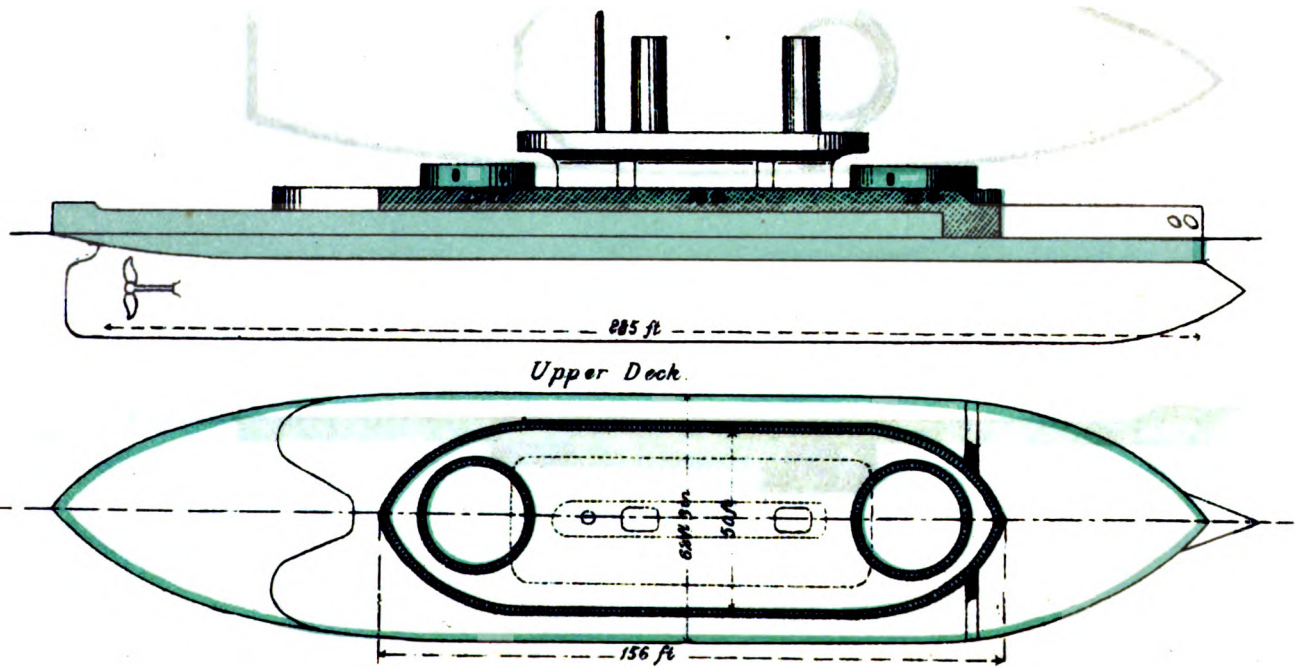
"Devastation".

"Thunderer".



HANHART LITH

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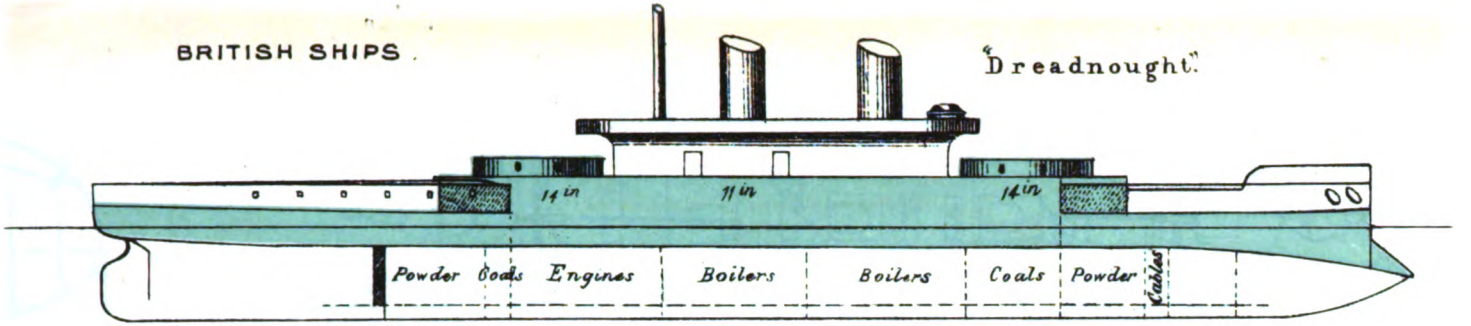
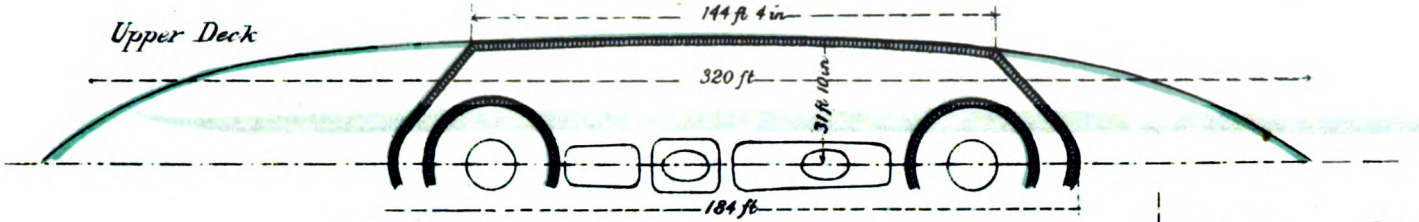
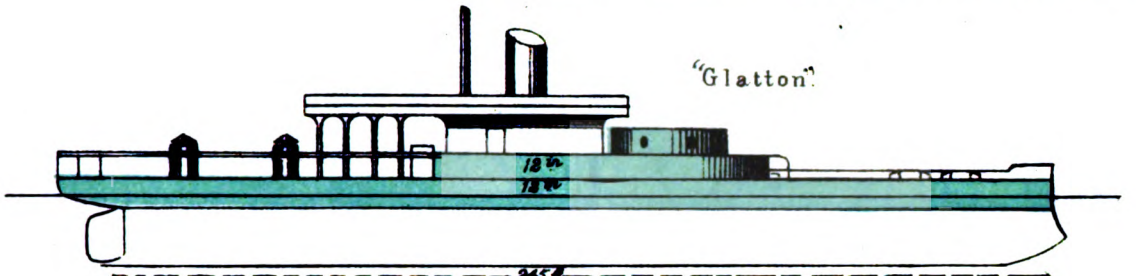
BRITISH SHIPS.

"Dreadnought."

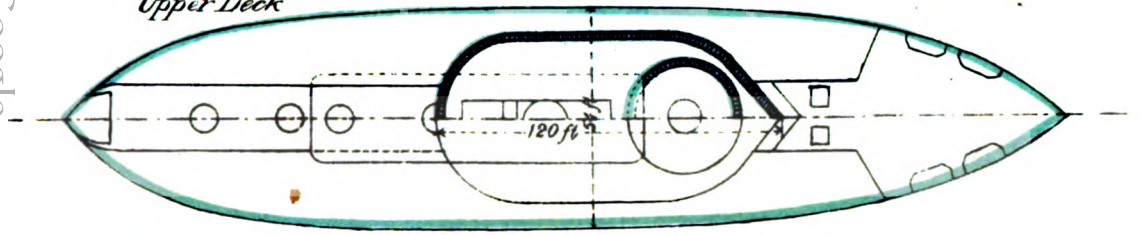




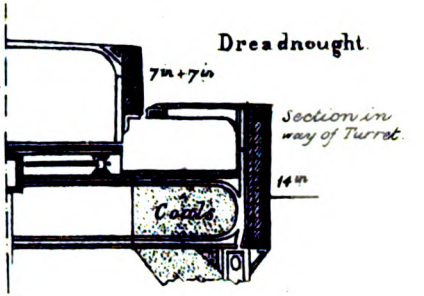
"Glatton."



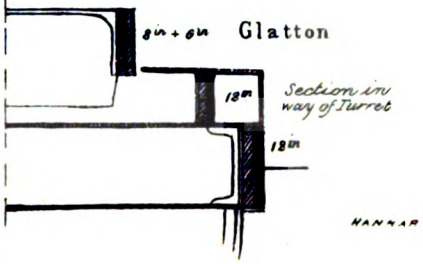
Upper Deck



Dreadnought.



Glatton



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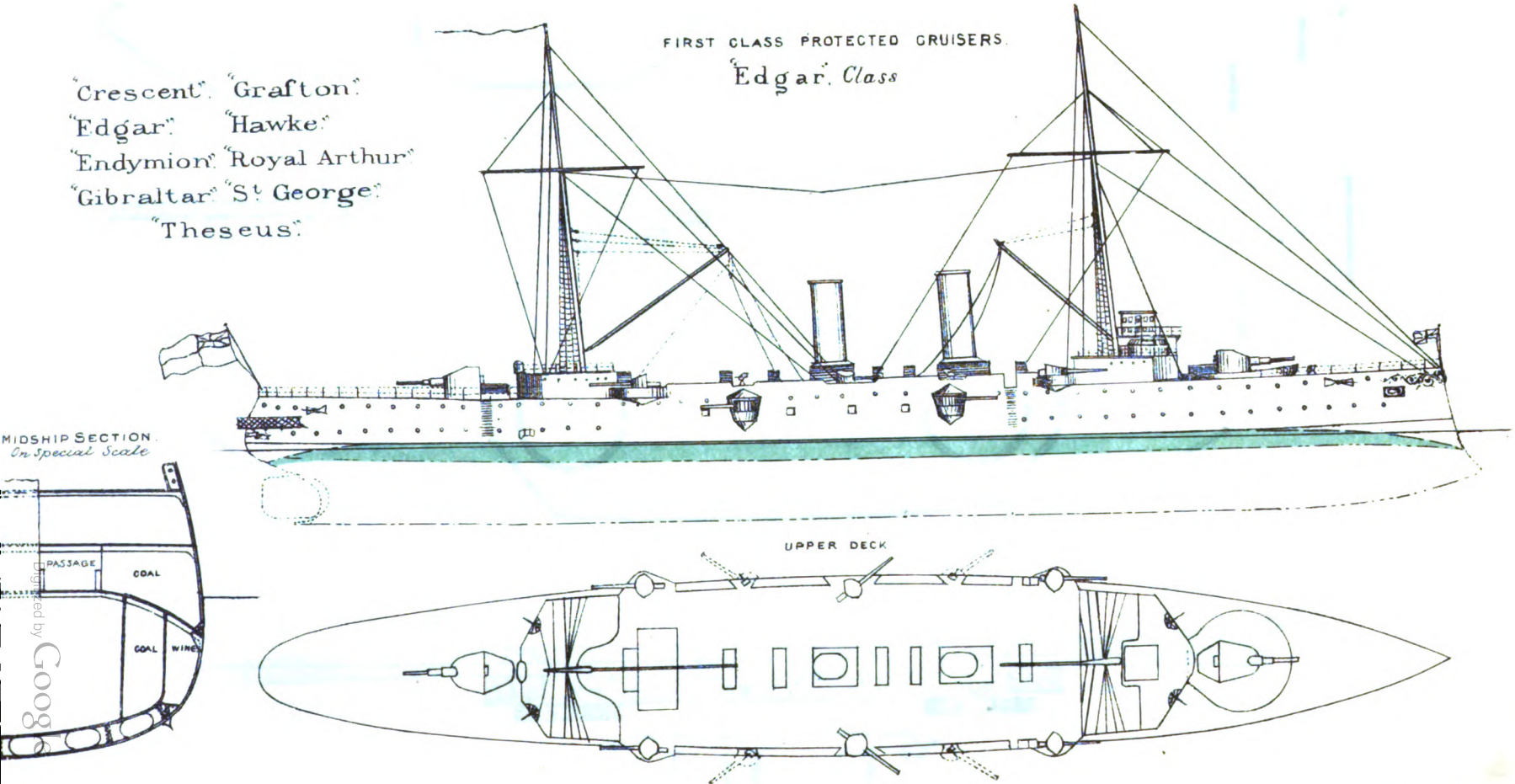
BRITISH SHIPS.

FIRST CLASS PROTECTED CRUISERS.

"Edgar" Class

"Crescent" "Grafton"
"Edgar" "Hawke"
"Endymion" "Royal Arthur"
"Gibraltar" "St George"
"Theseus"



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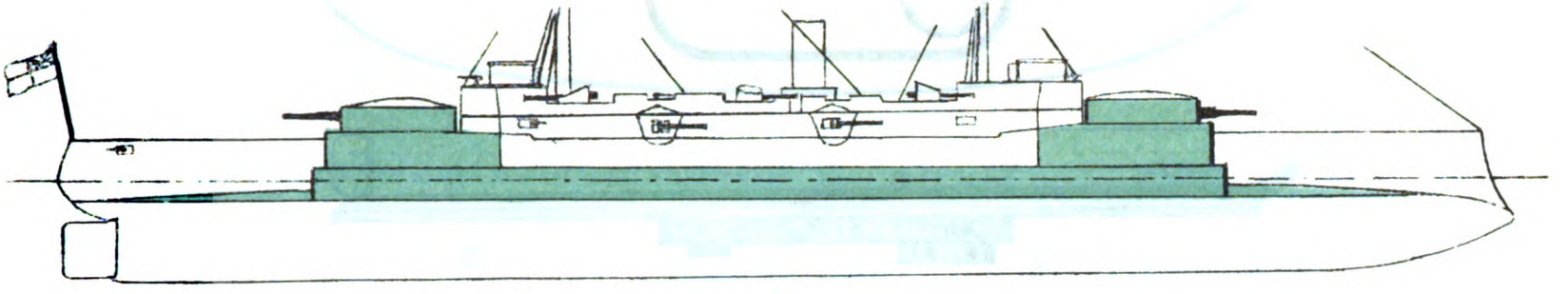
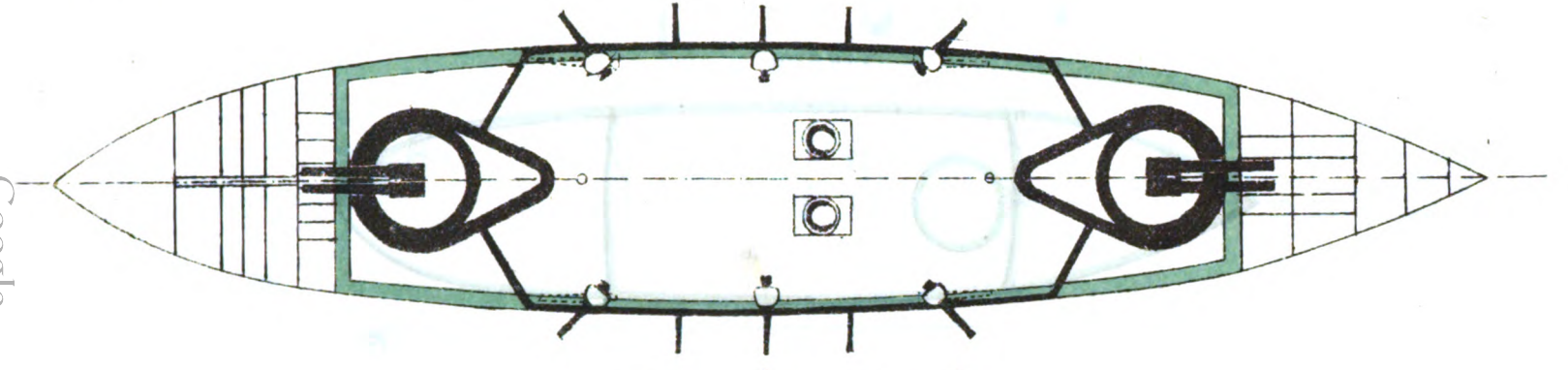
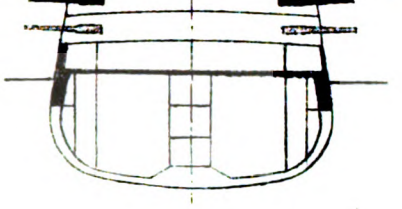
"Hood" (Turret Ship with Redoubts)





On Special Scale



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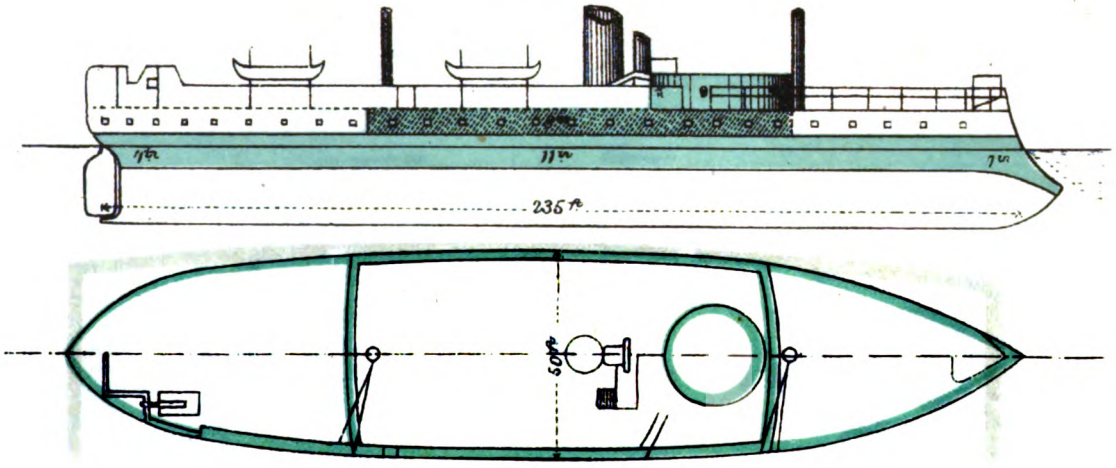
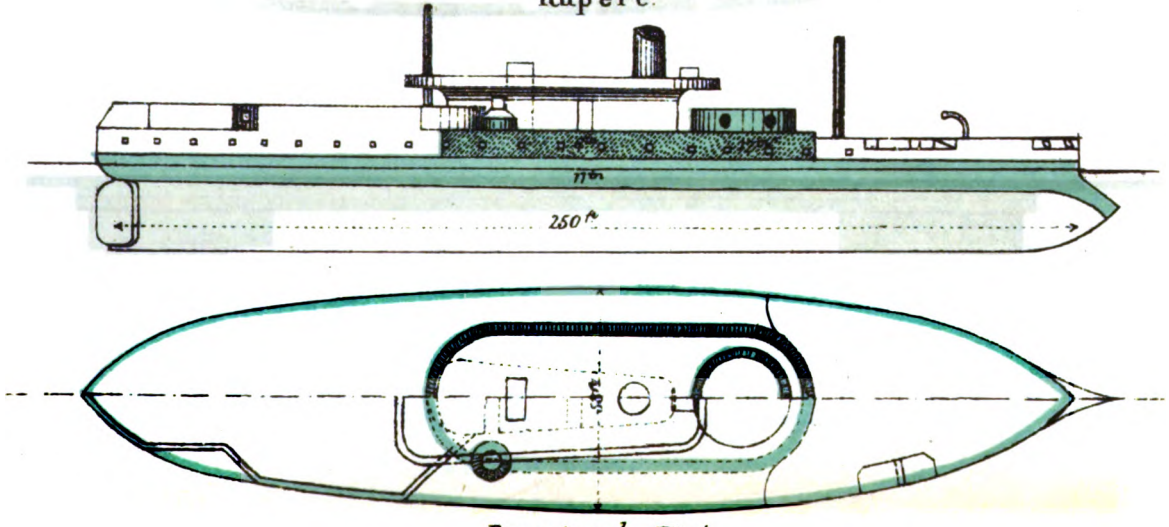
"Hotspur"



"Rupert"



Breastwork Deck.

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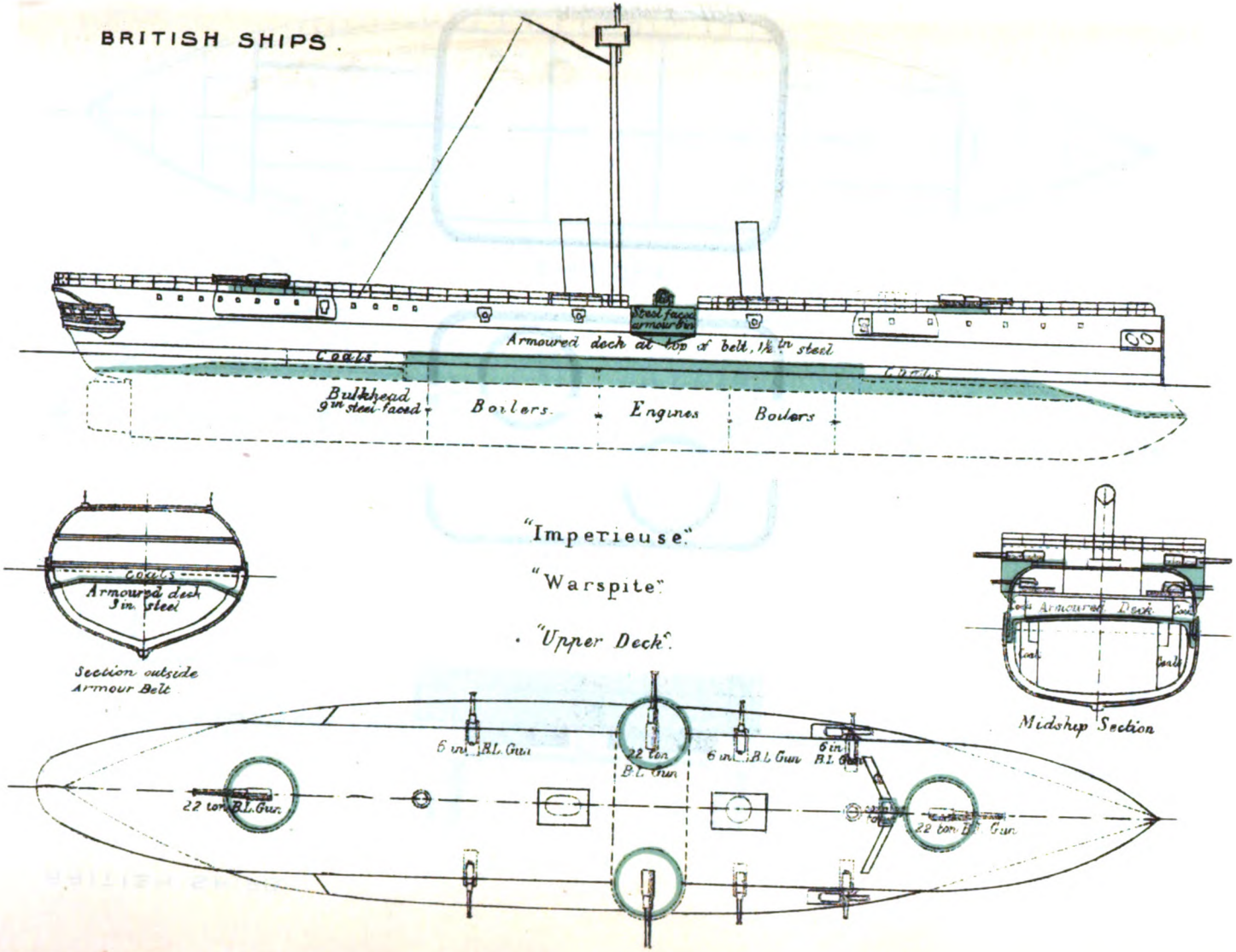

HANHART LITH

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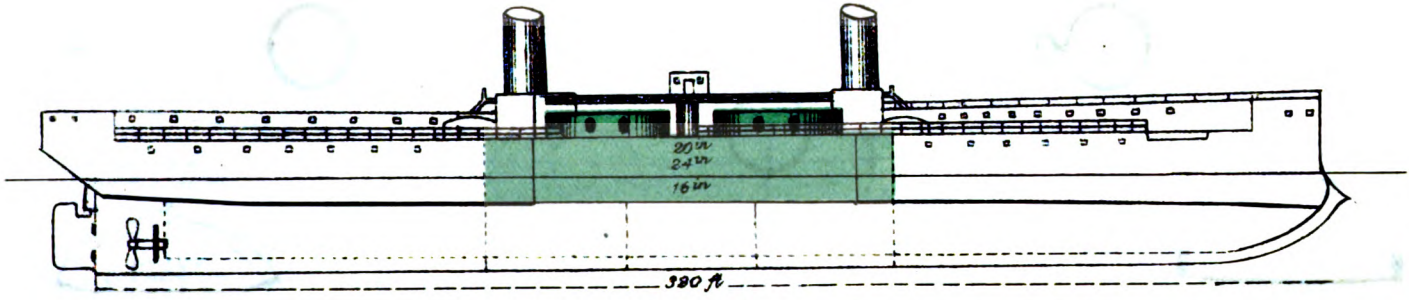
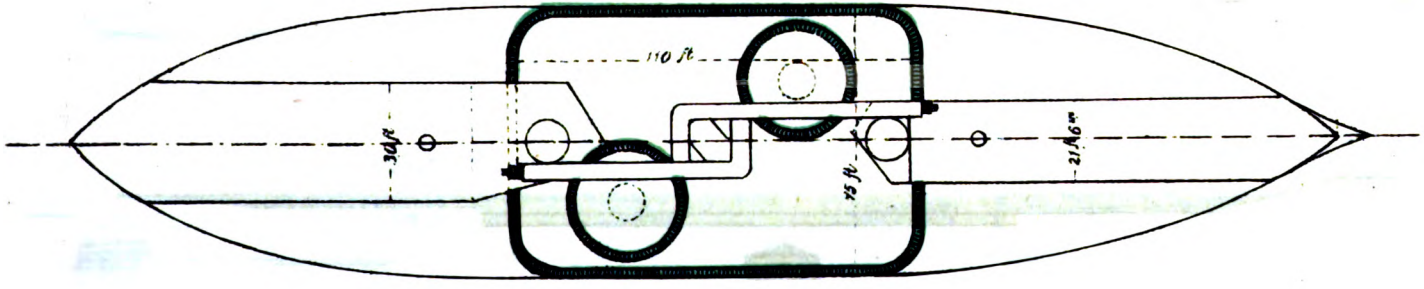
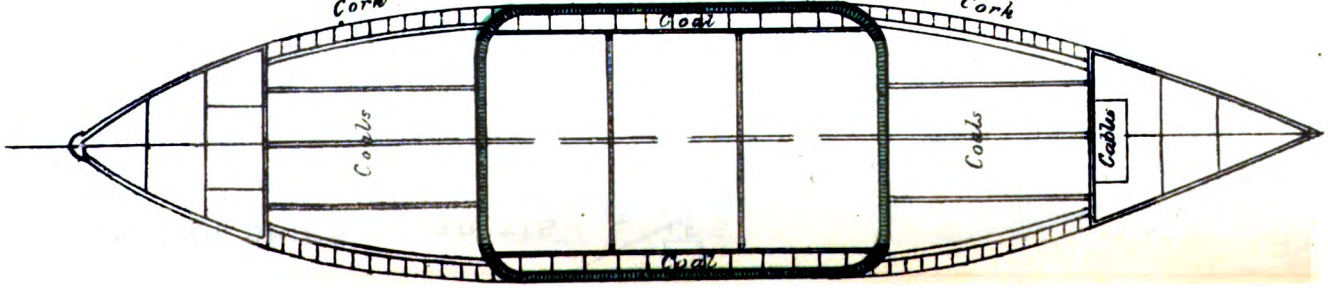
"Inflexible."



Upper Deck.



Lower Deck.



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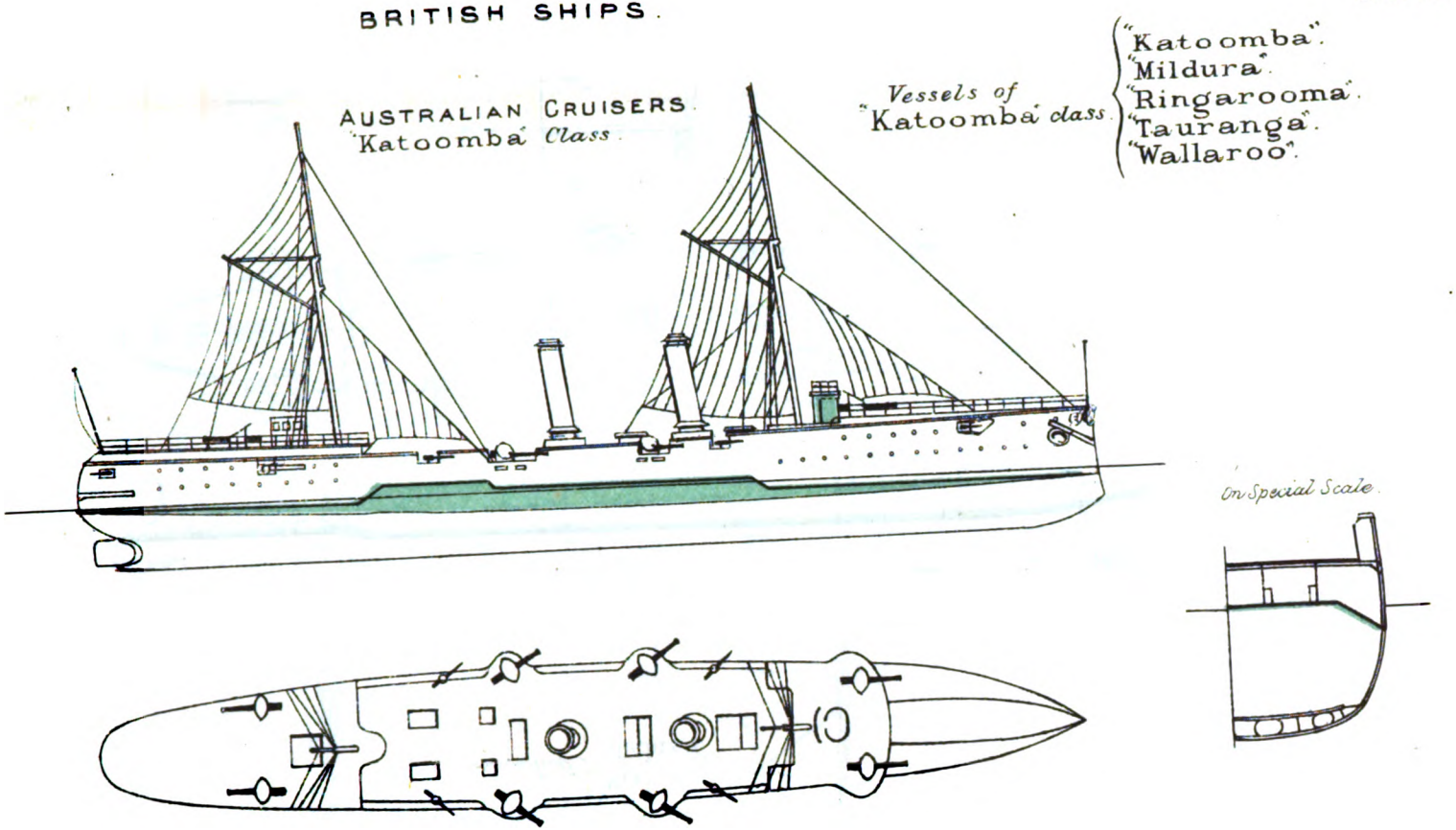
BRITISH SHIPS.



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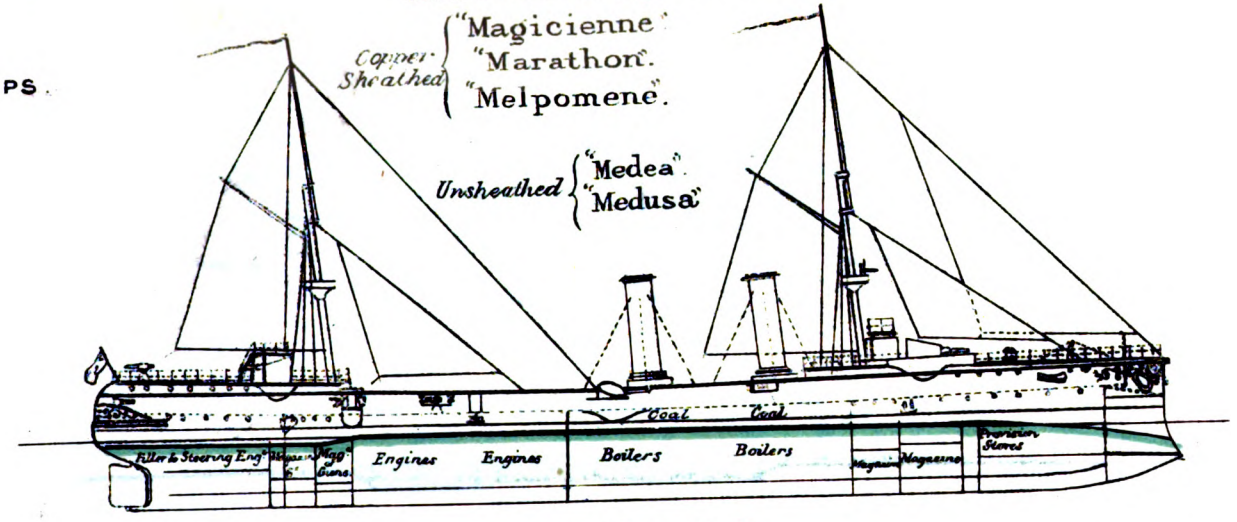
BRITISH SHIPS.

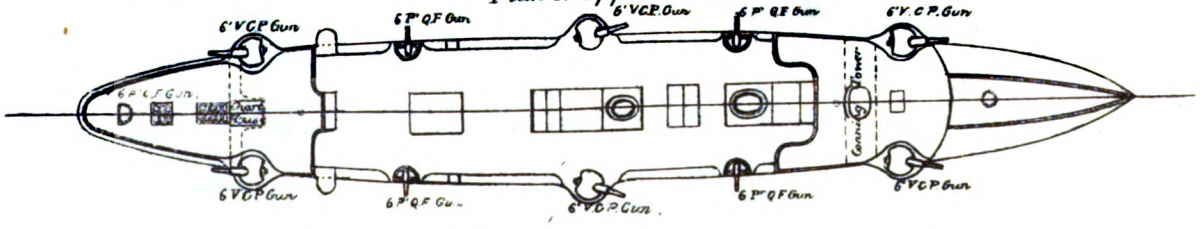
Class Protected Cruisers.

Copper Sheathed { "Magicienne" "Marathon" "Melpomene"

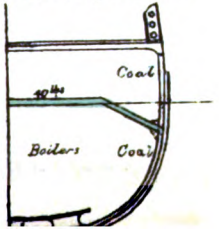
Unsheathed { "Medea" "Medusa"



Plan of Upper Works.



Midship Section.



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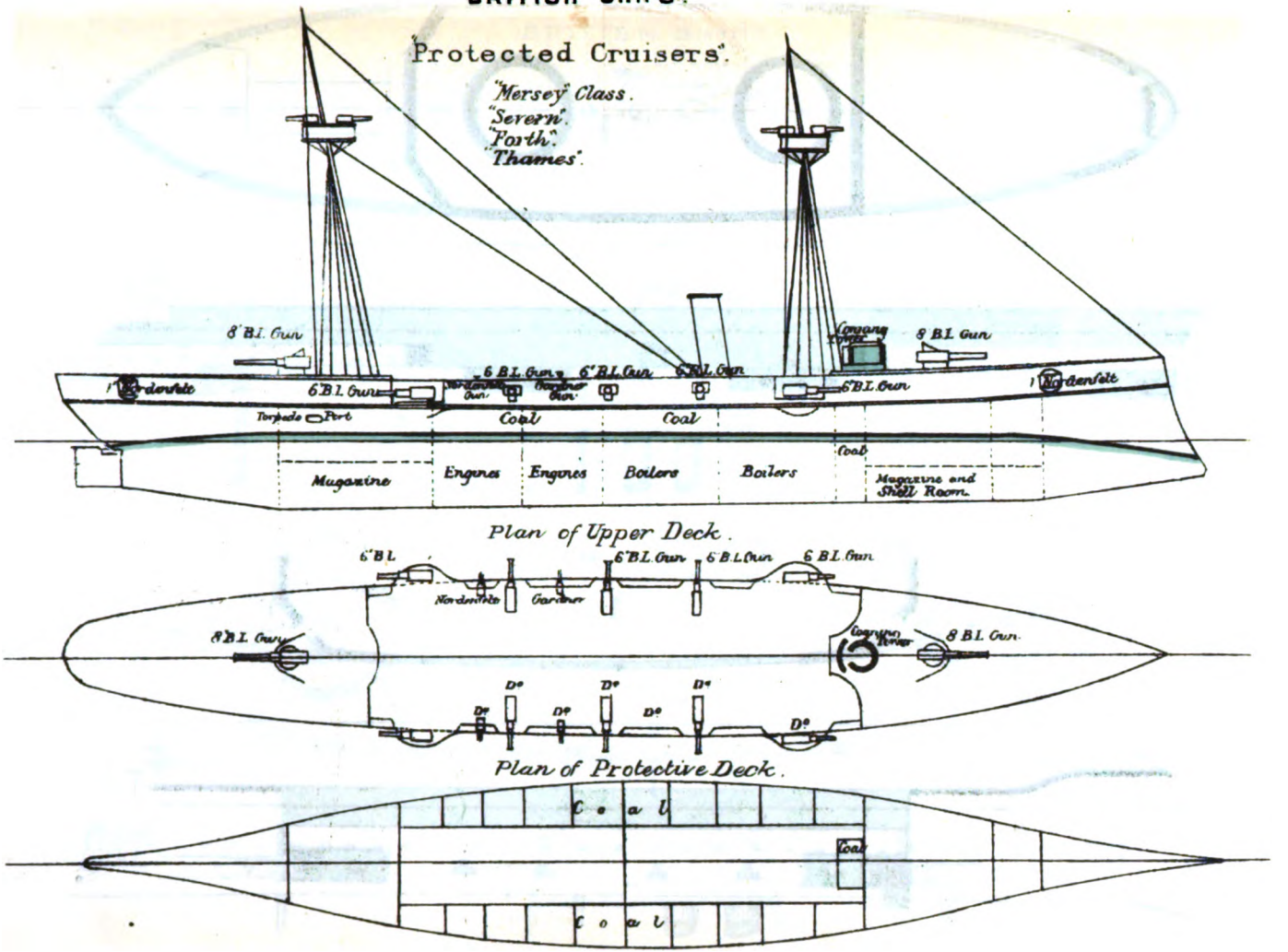

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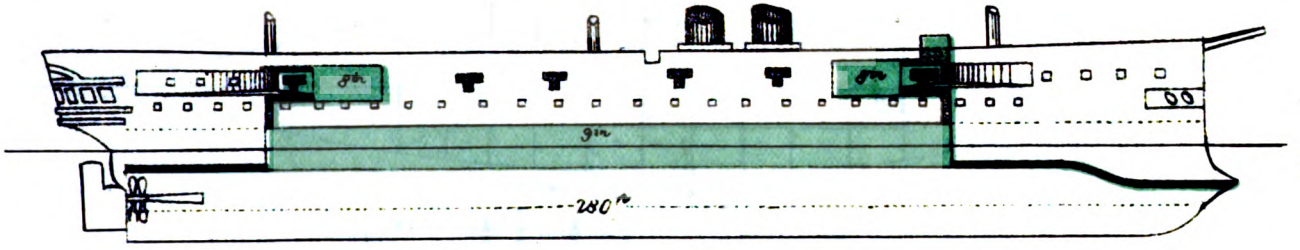
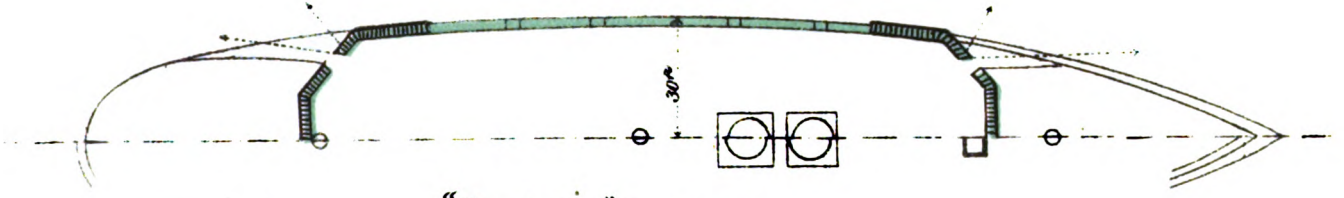
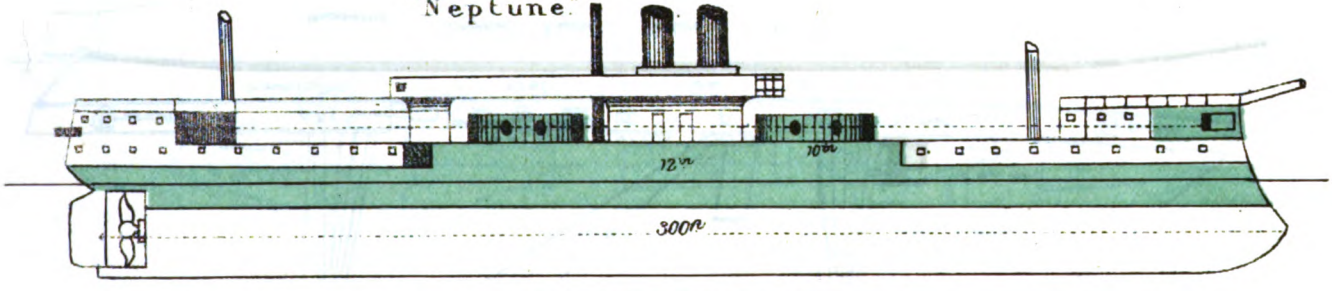
BRITISH SHIPS.

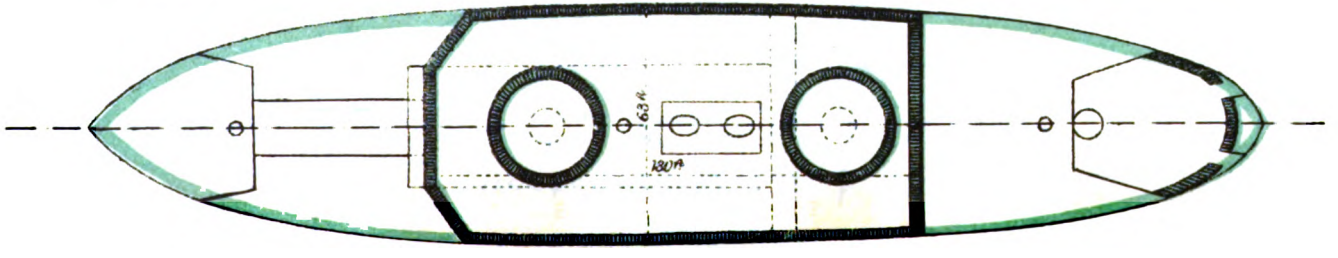
"Nelson"
"Northampton".





"Neptune"





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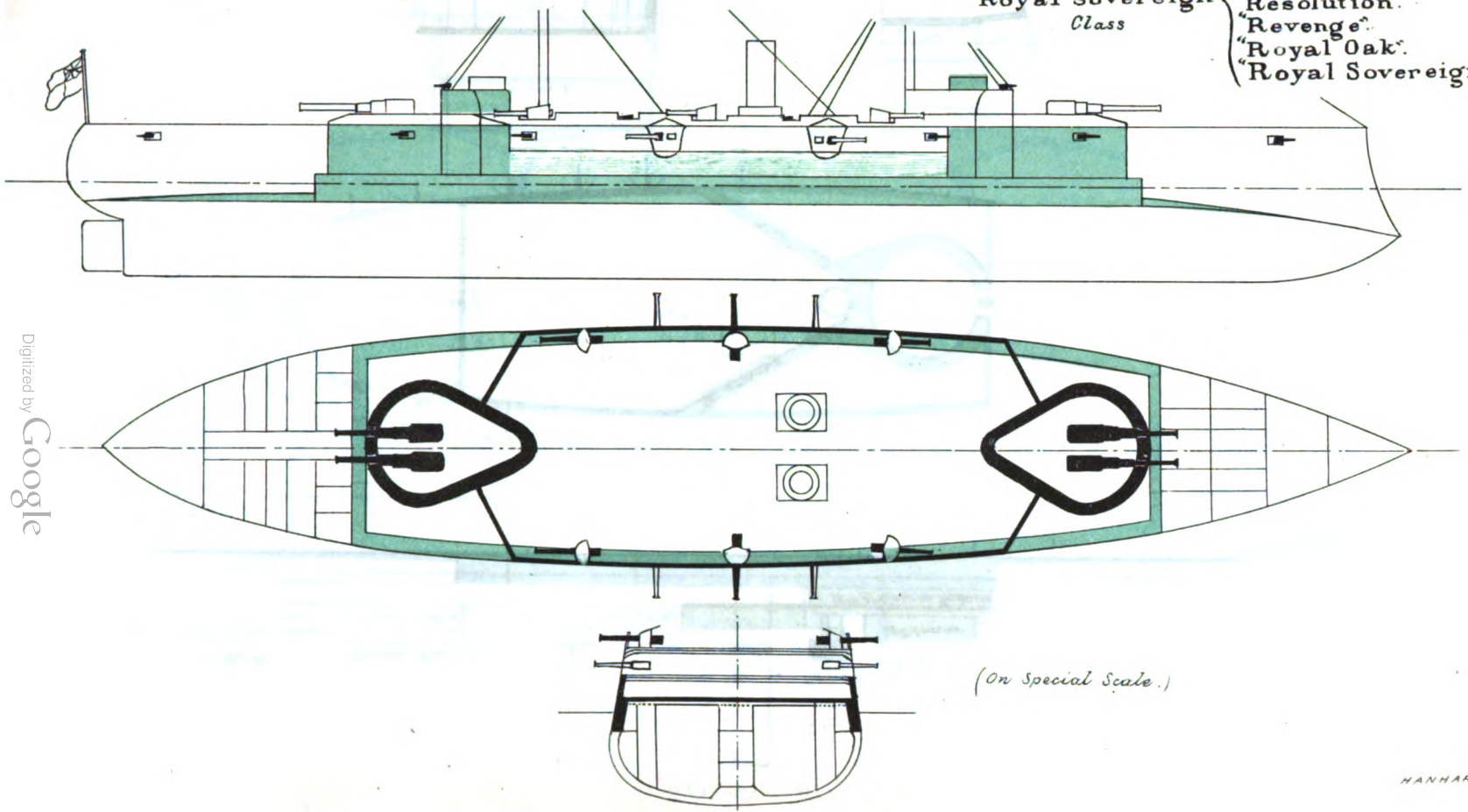
BRITISH SHIPS.

"Empress of India." Pl. 23.

"Royal Sovereign".
of 14,150 tons displacement
& 13,000, I.H. power.

"Royal Sovereign" Class
- "Ramillies".
- ~~"Renown".~~
- "Repulse".
- "Resolution".
- "Revenge".
- "Royal Oak".
- "Royal Sovereign".



(On Special Scale.)

HANHART LITH.

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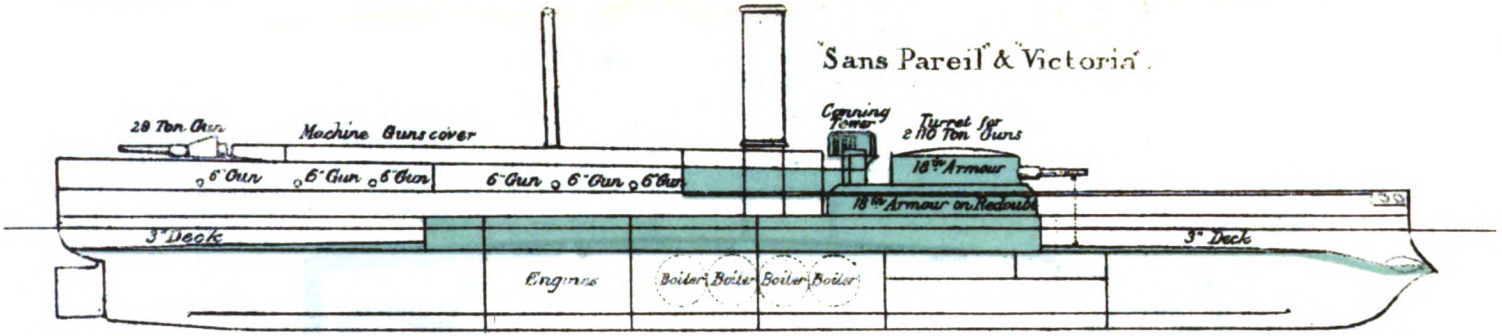
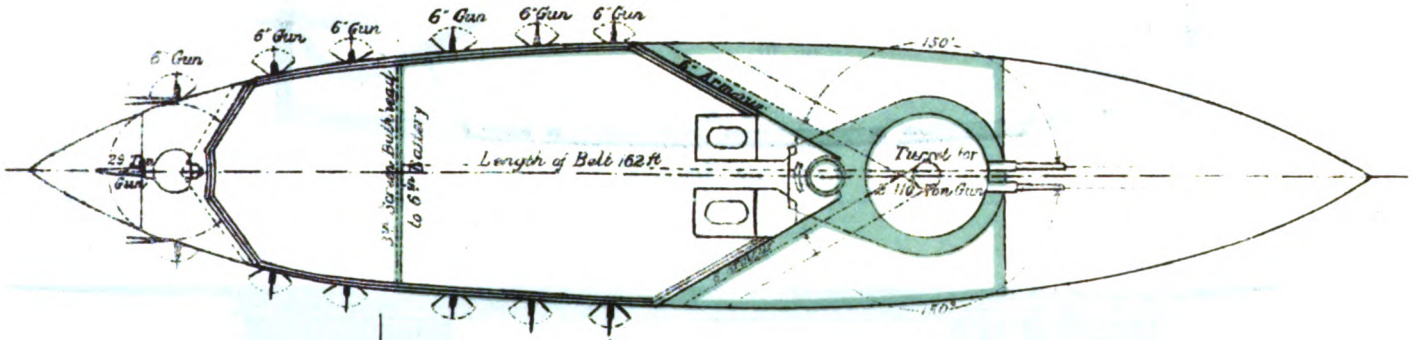
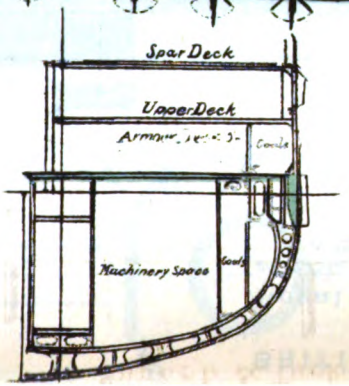
BRITISH SHIPS.

Pl. 24.

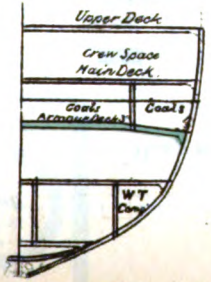
"Sans Pareil" & "Victoria".







Midship Section



Section before Turret

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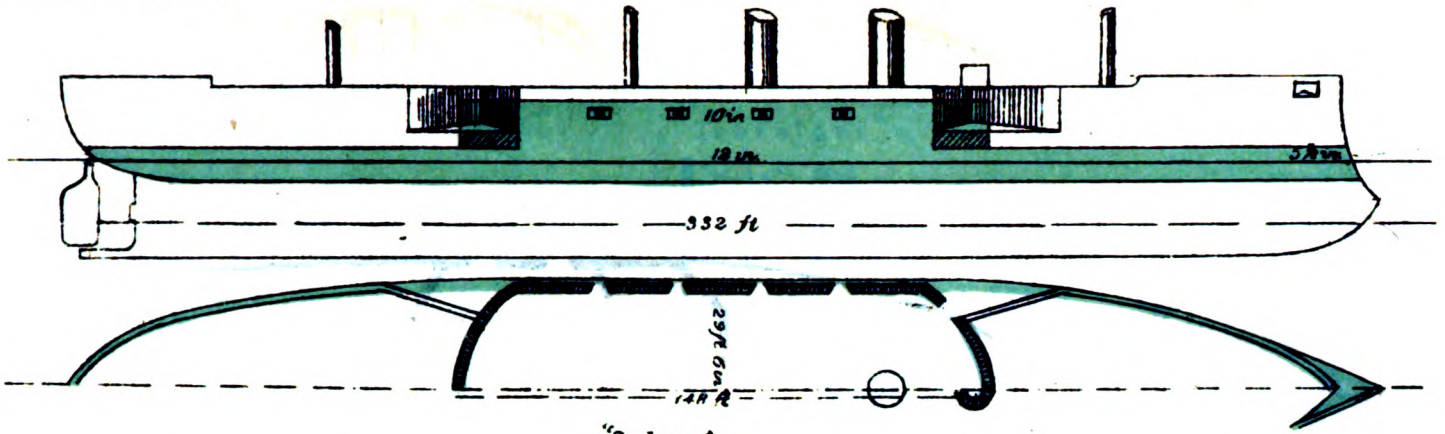
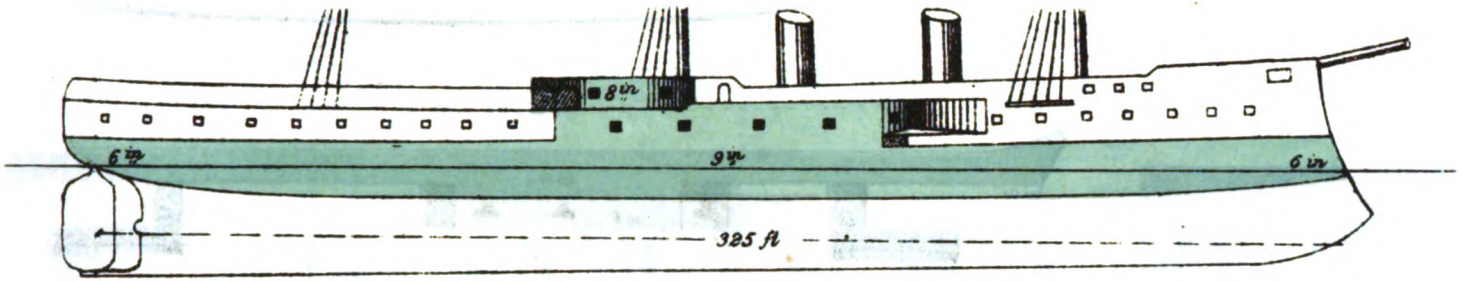
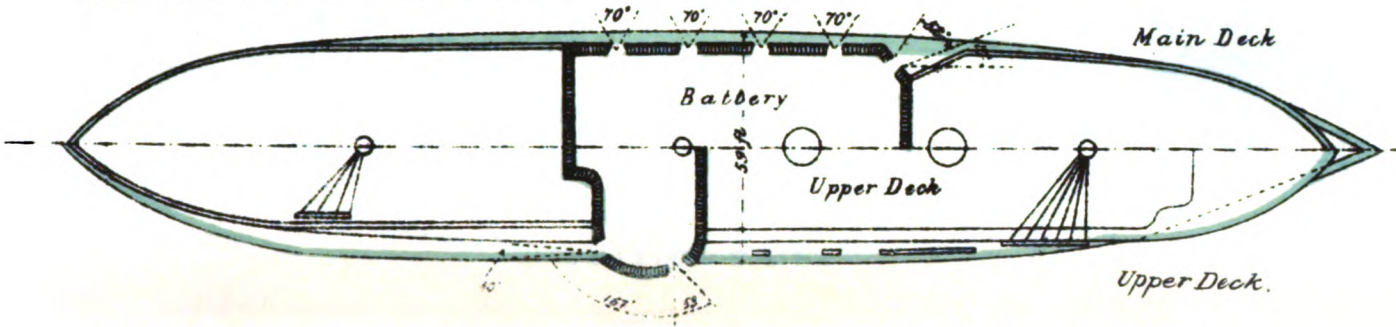
"Superb" & Turkish Ship "Mesoodieh"



"Sultan"





HANNART LITH

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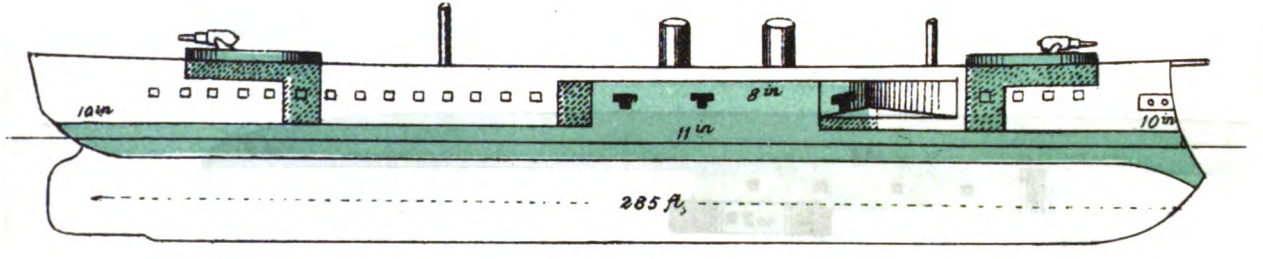
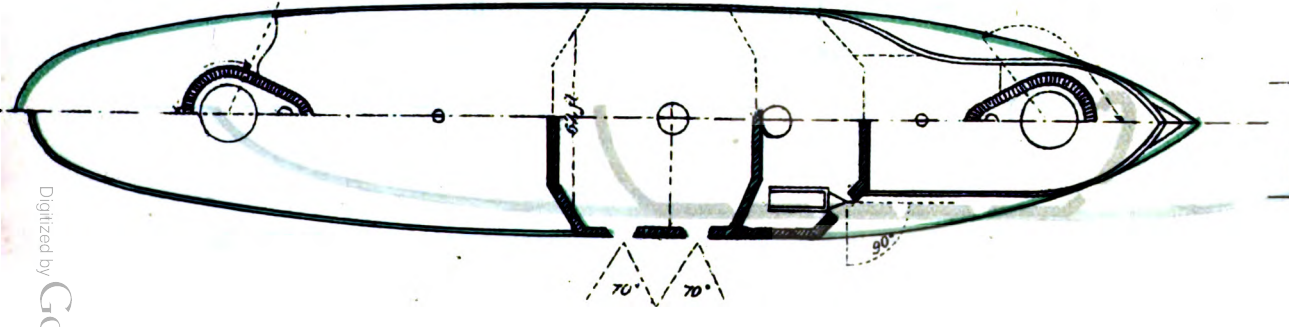
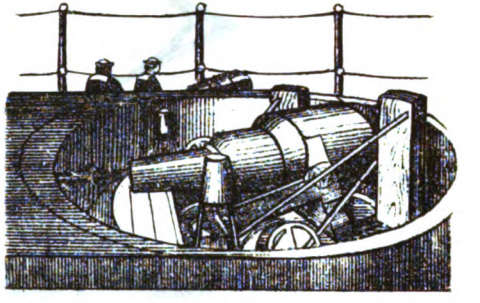
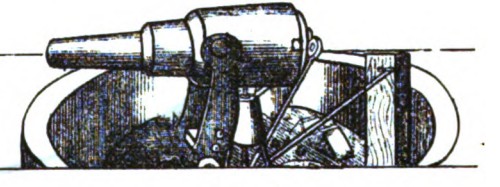
"Téméraire".







Téméraire's Gun, loading position.



Temeraire's Gun, firing position.

HANHART LITH.

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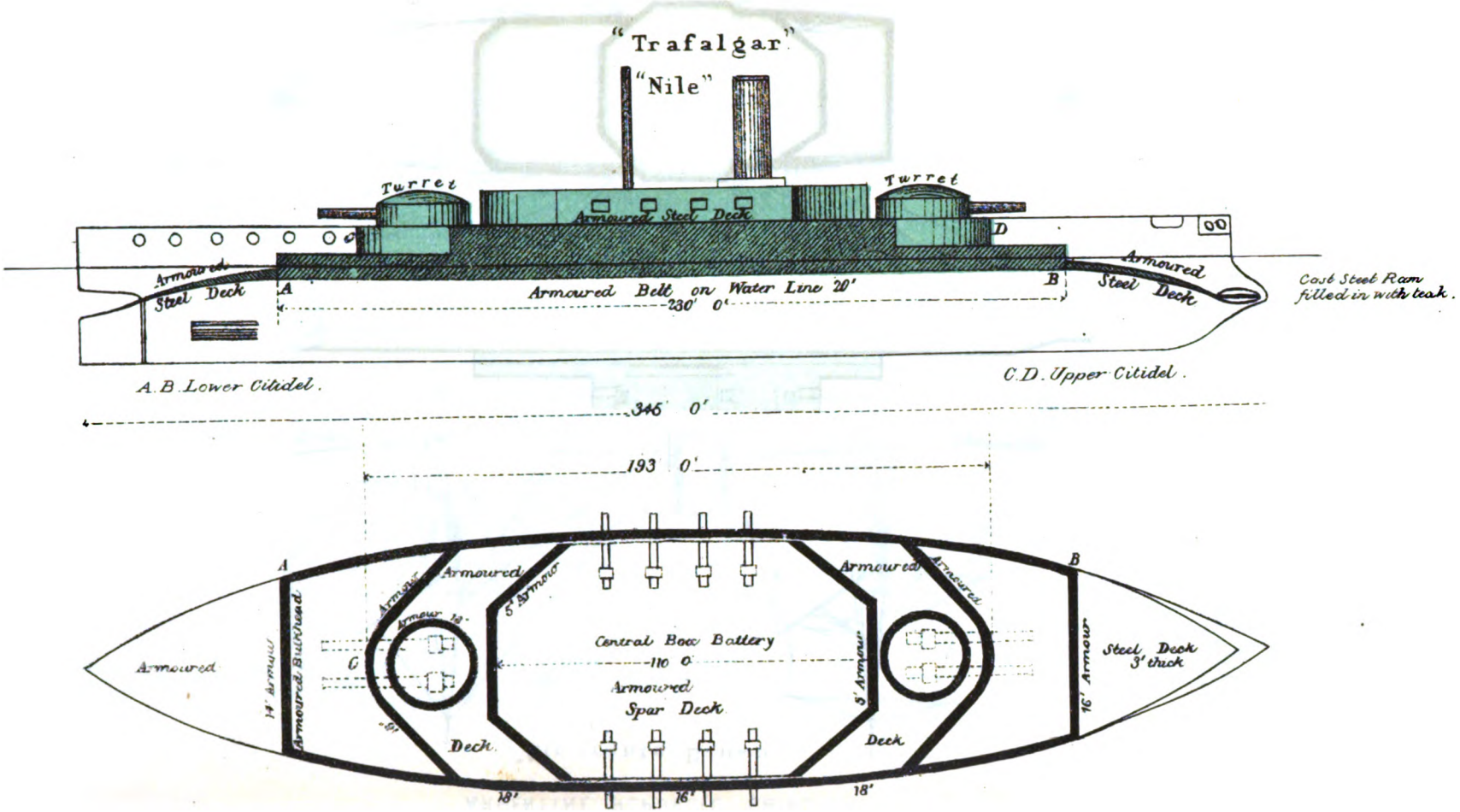
BRITISH SHIPS.



HANHART LITH.

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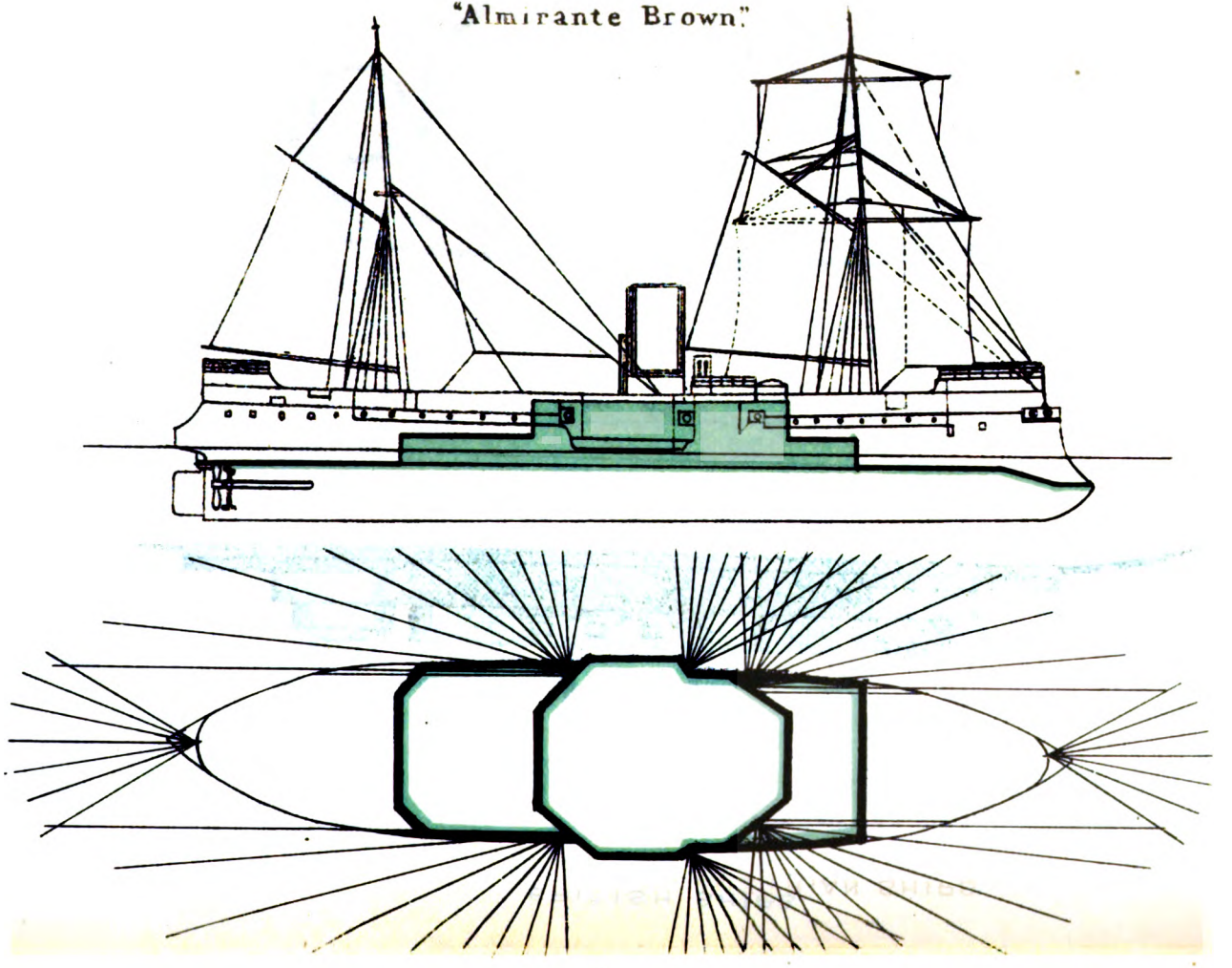
ARGENTINE REPUBLIC SHIPS.

Pl. 28.

"Almirante Brown."



DANHART LITH.

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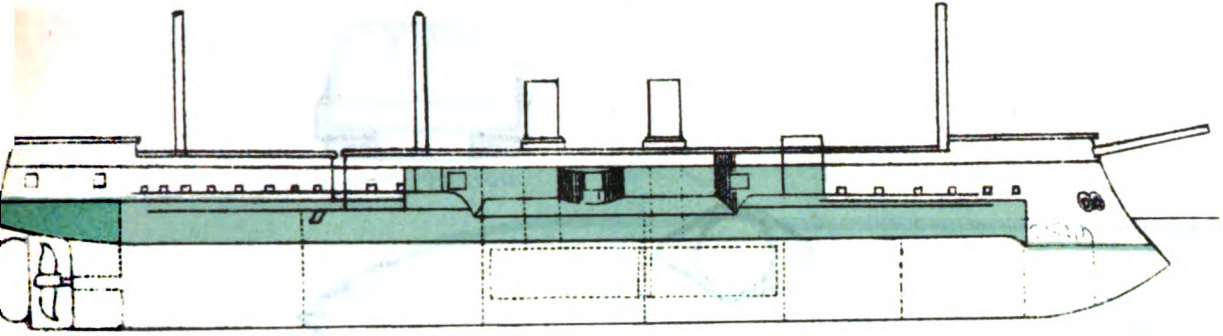
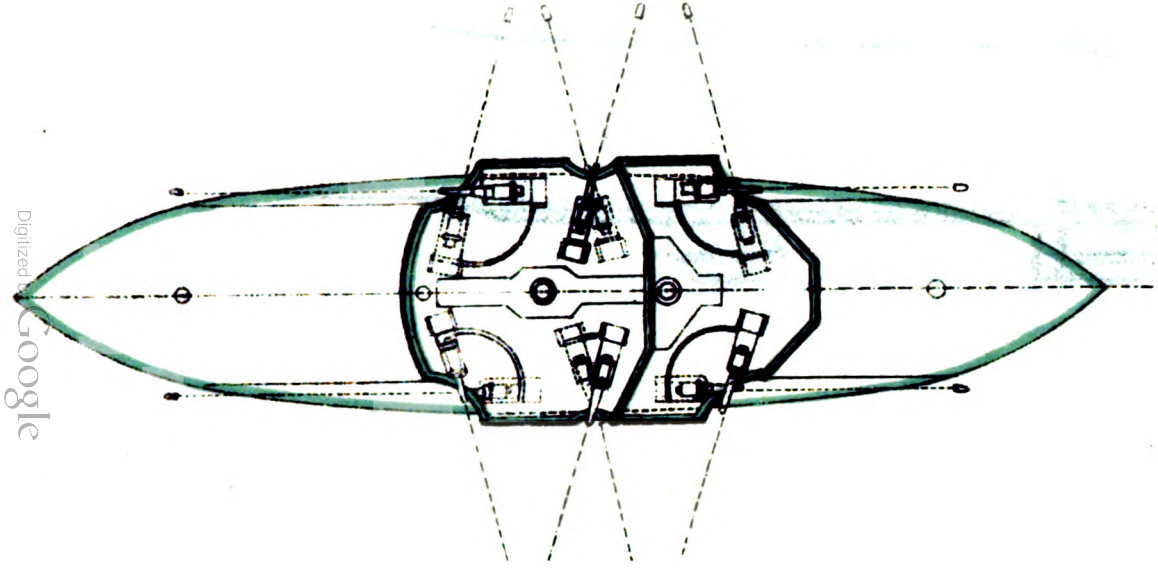
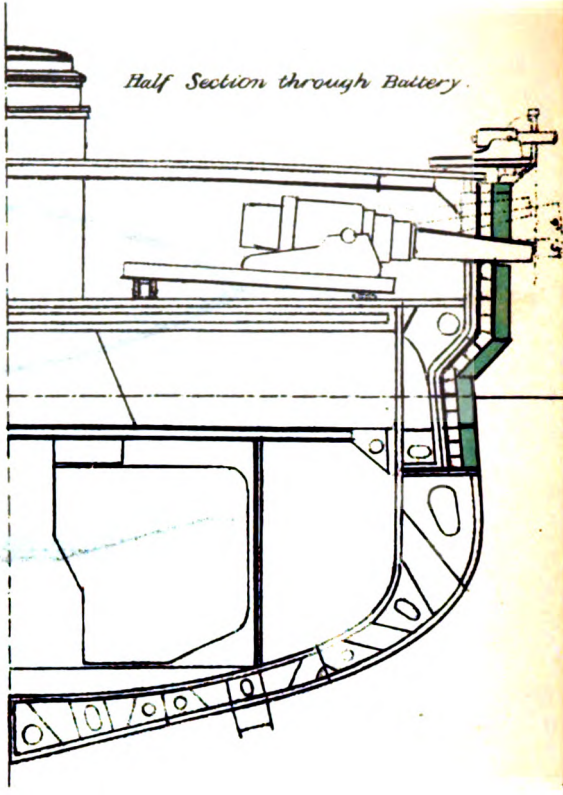
"Tegetthoff."







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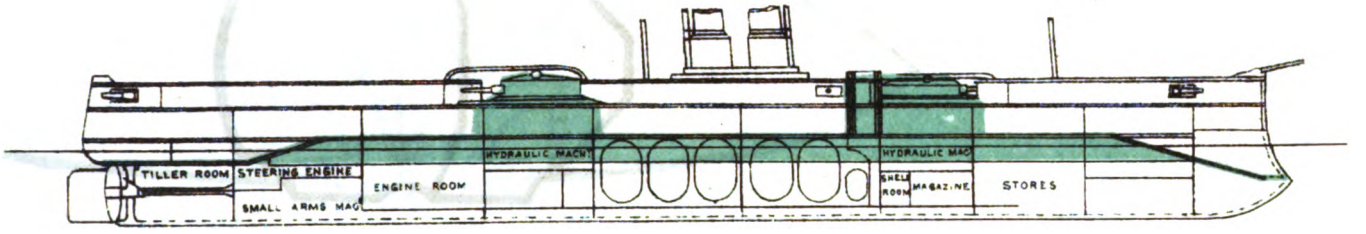
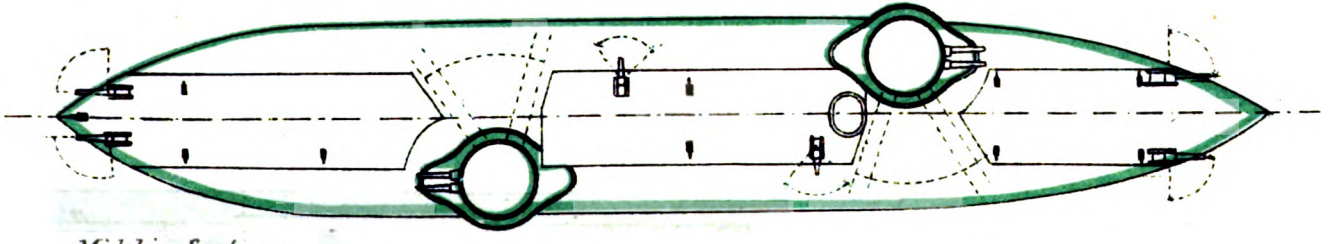
BRAZILIAN SHIPS.

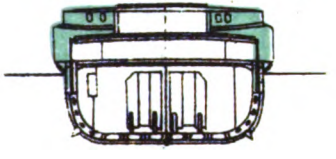
"Riachuelo."



Plan of Upper Deck



Midship Section



HANHART LITH.

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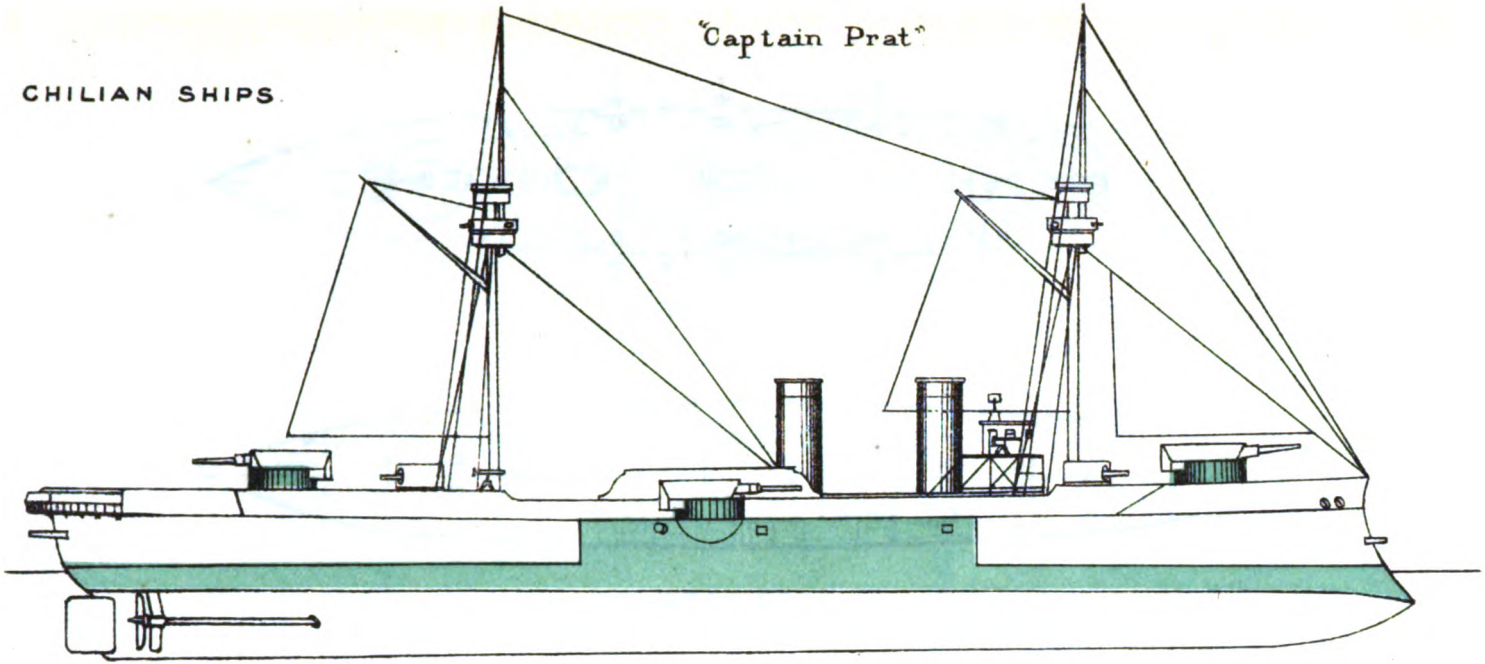
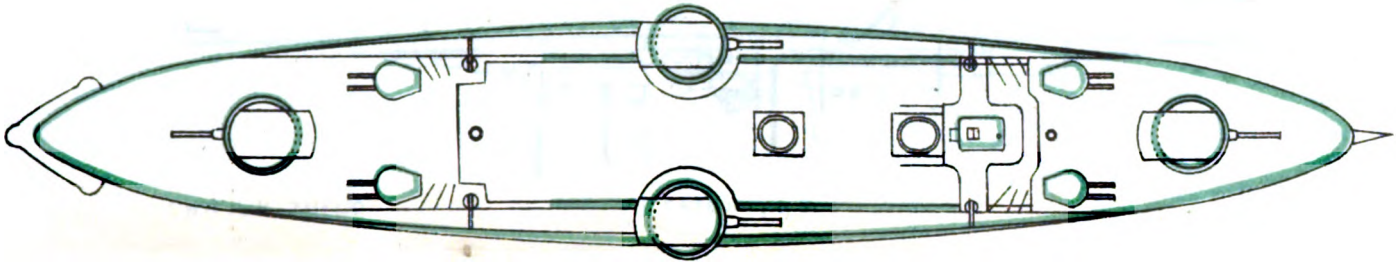
CHILIAN SHIPS.

"Captain Prat"





HANNART LITH.

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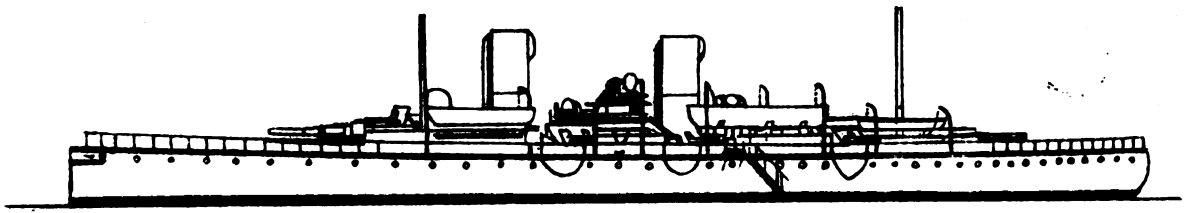
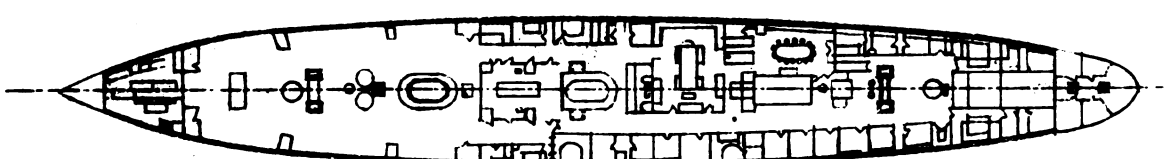
CHILIAN SHIPS

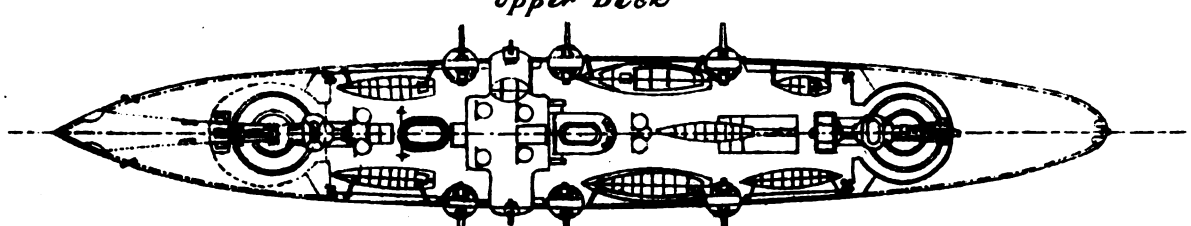
"Esmeralda"



Main Deck



Upper Deck



HANHART LITH.

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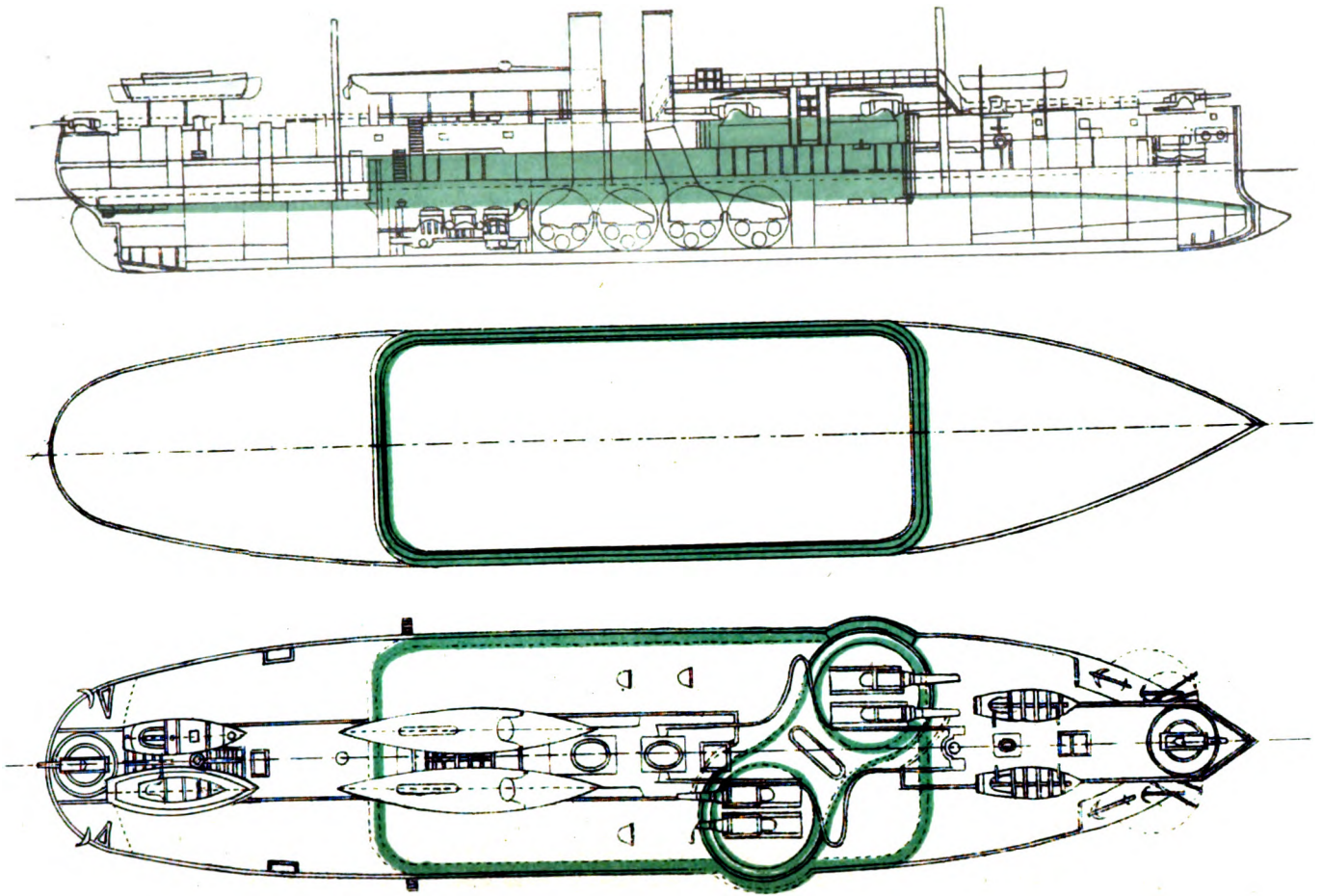
CHINESE SHIPS.

Pl. 33.

"Ting Yuen" & "Chen Yuen"



HANHART LITH.

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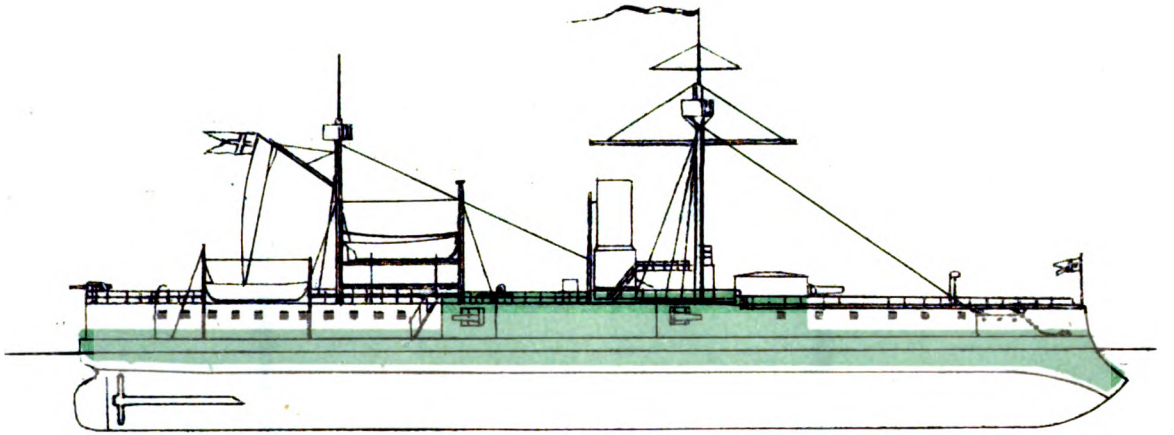
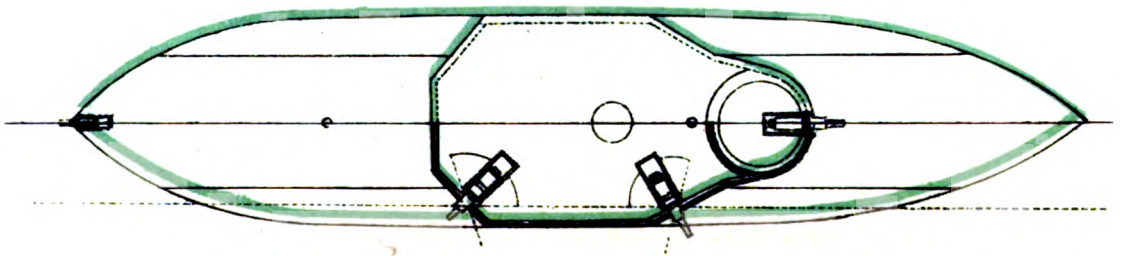
"Helgoland"





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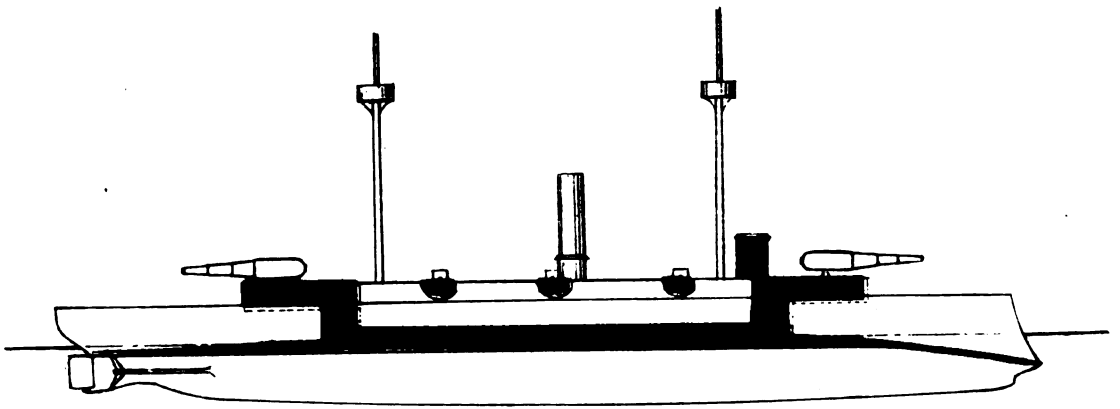
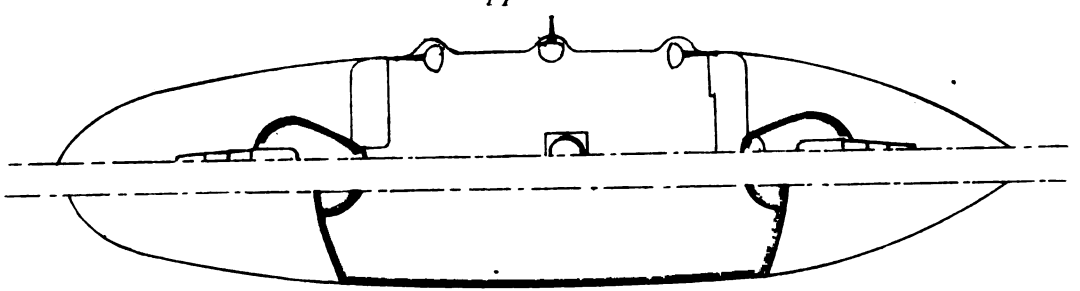
"Iver Hvitfeld."



Upper Deck



Armoured Deck

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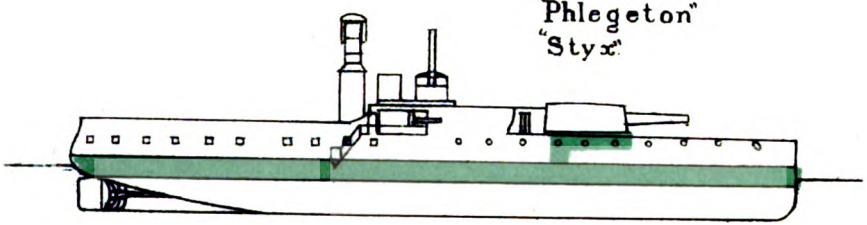
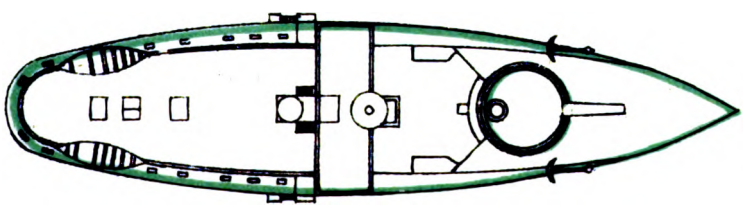
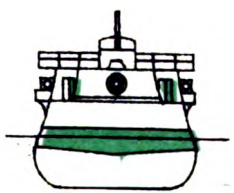
FRENCH SHIPS

"Acheron".
"Cocyte".
"Phlegeton"
"Styx".







HANHART LITH

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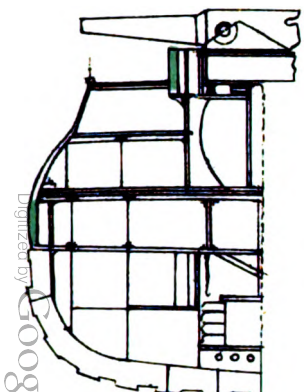
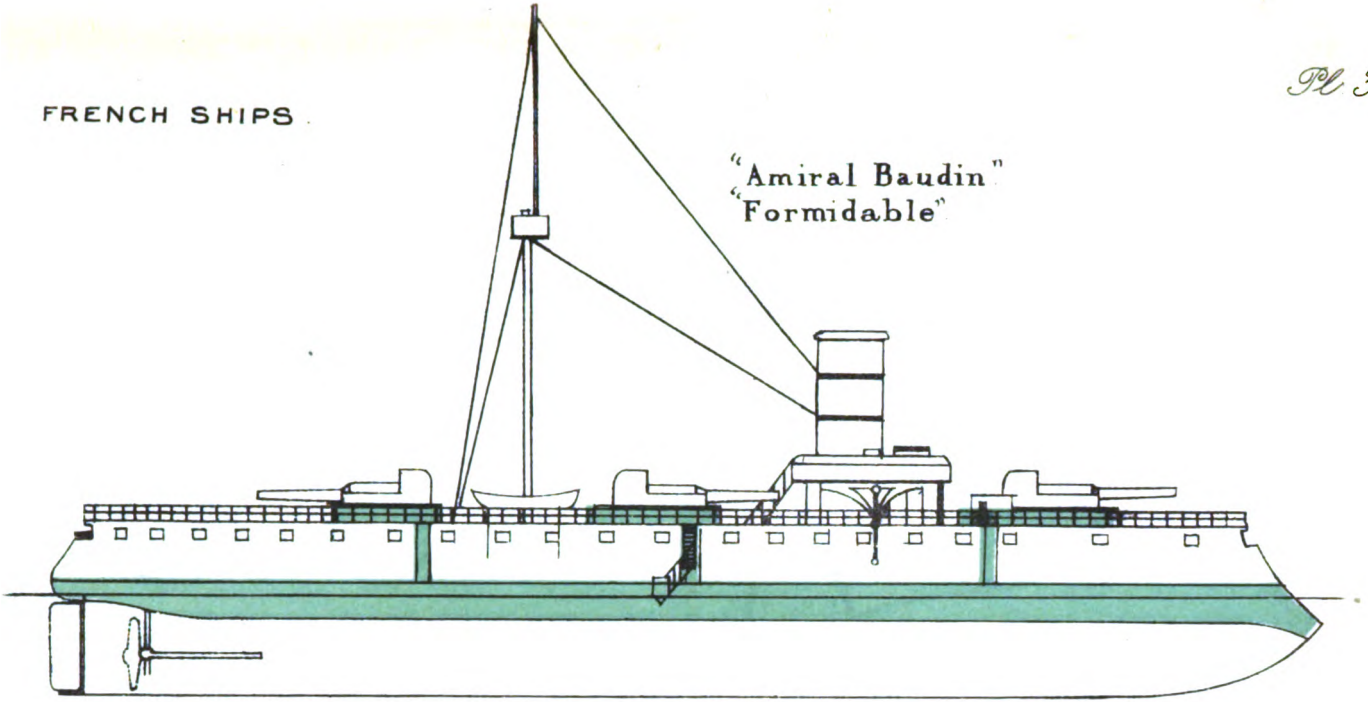
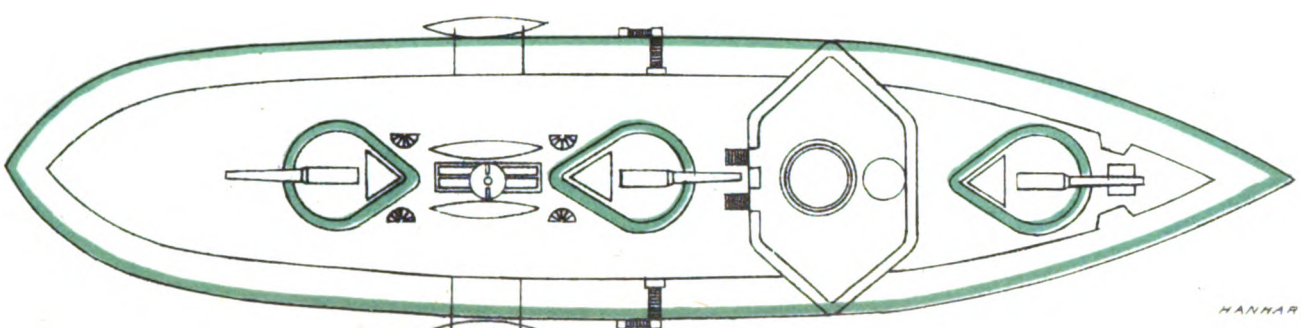
FRENCH SHIPS.

"Amiral Baudin"
"Formidable"







HANNART LITH.

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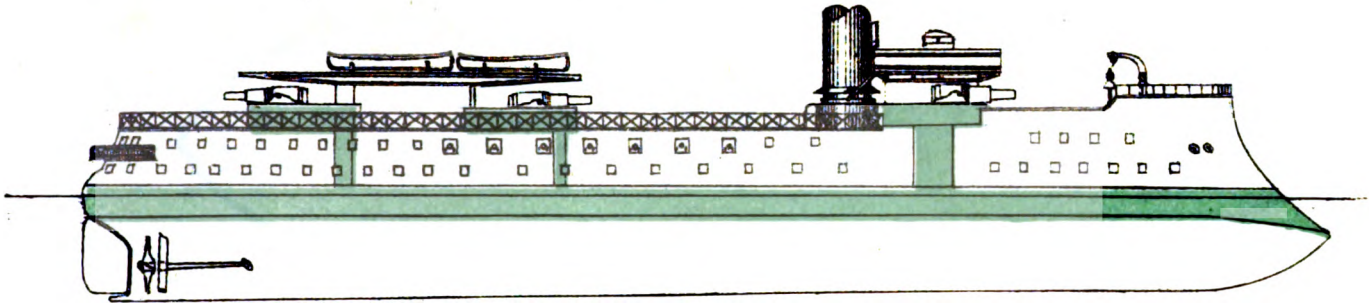
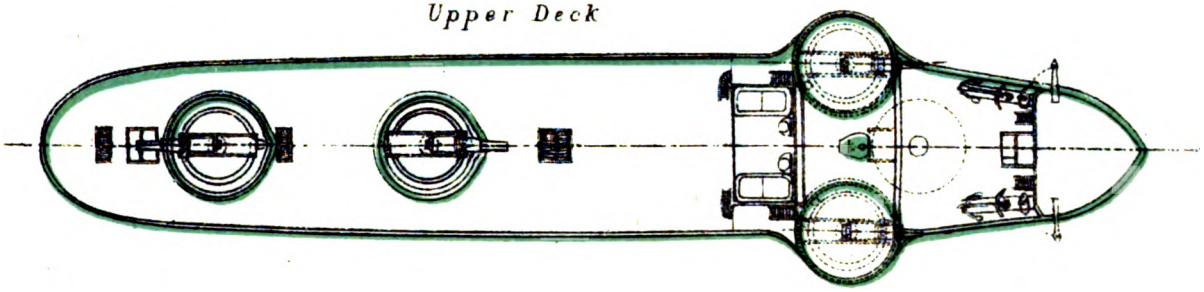
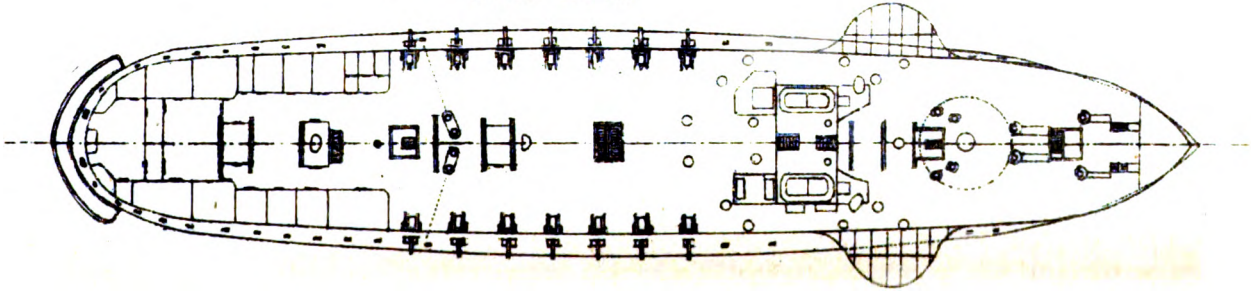
Amiral Duperre



Upper Deck



Main Deck



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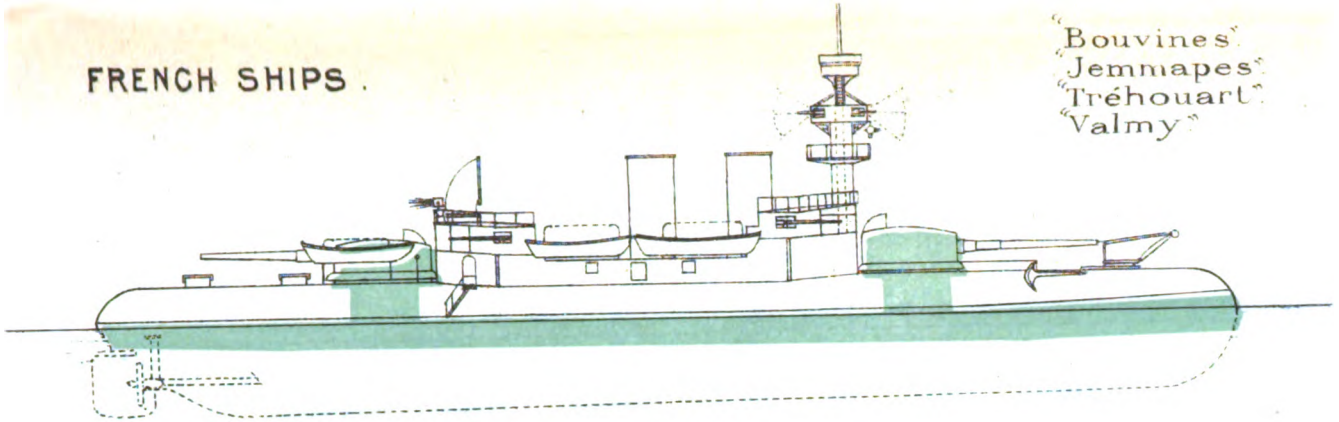
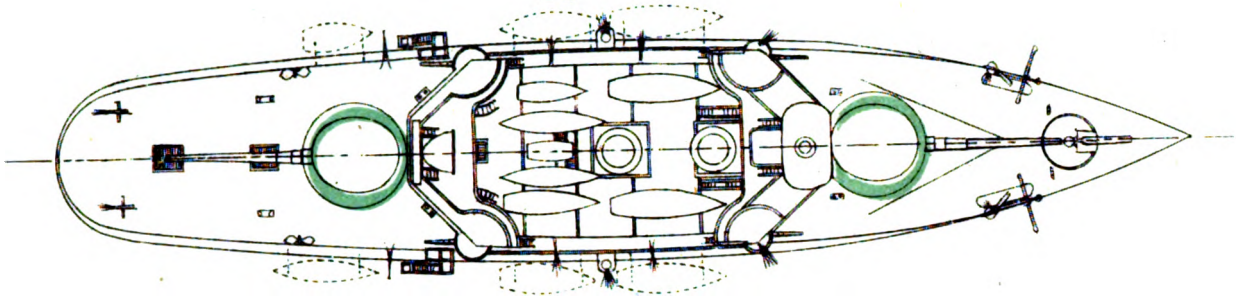
FRENCH SHIPS.

"Bouvines"
"Jemmapes"
"Tréhouart"
"Valmy"

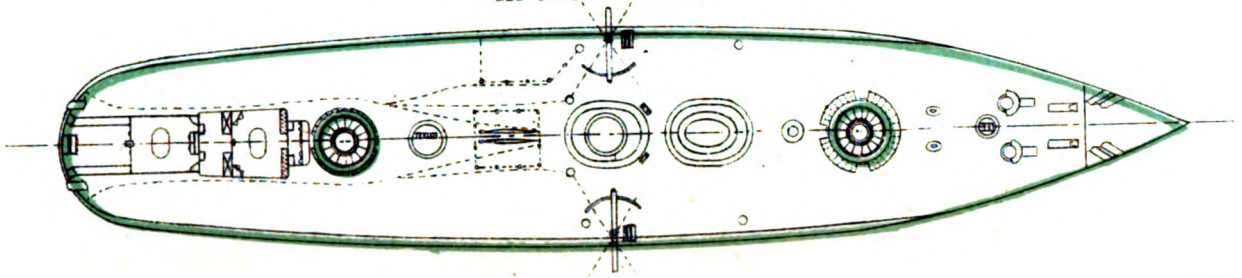
Pl. 39.



Upper Deck



Armour Deck



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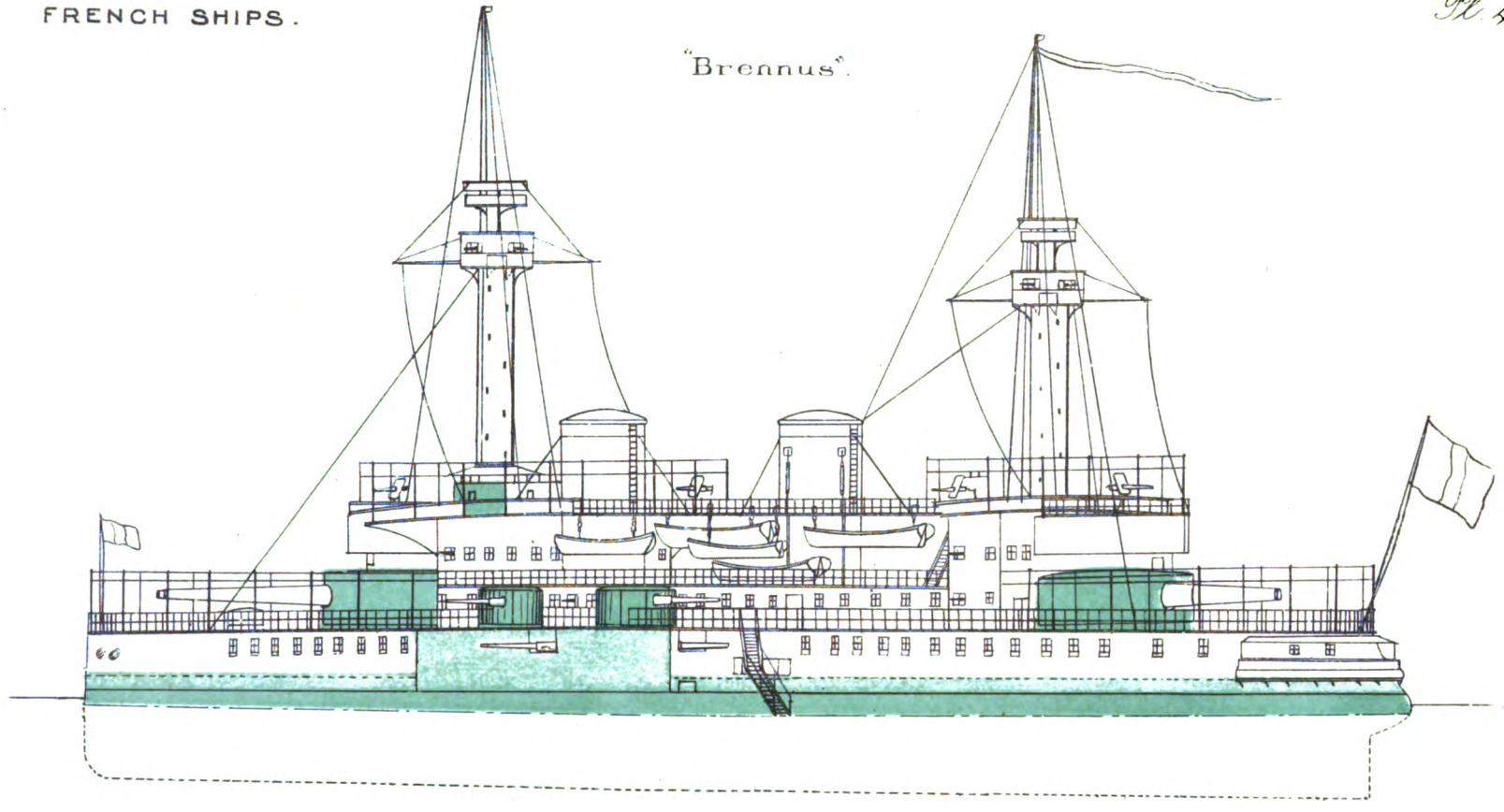
FRENCH SHIPS.

Pl. 40.

"Brennus".



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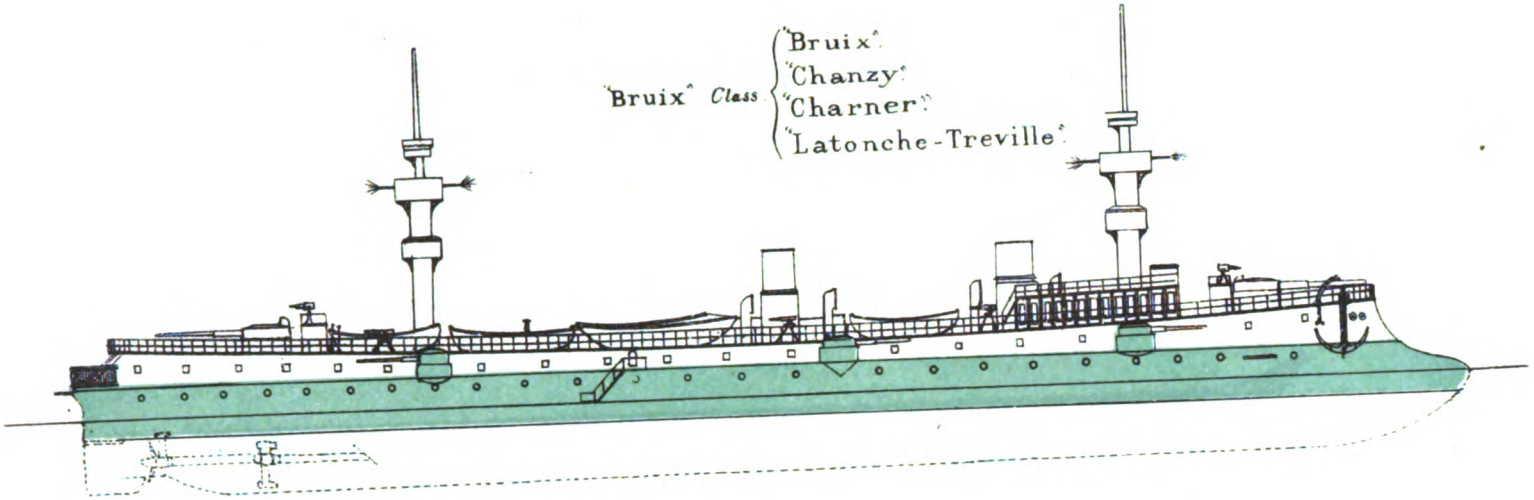
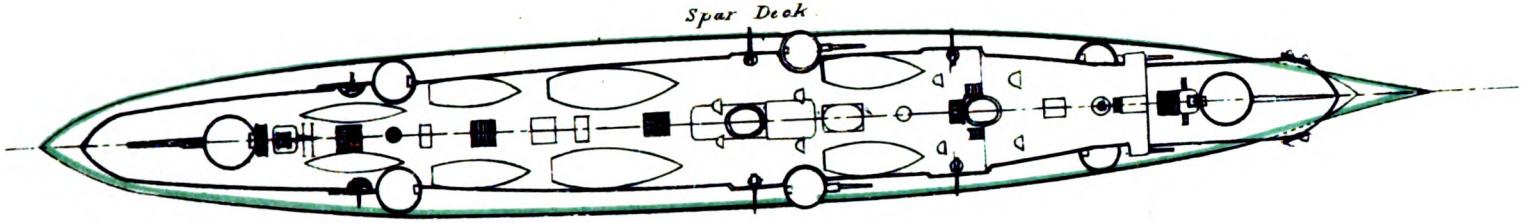
FRENCH SHIPS.

"Bruix" Class { "Bruix" / "Chanzy" / "Charner" / "Latonche-Treville"





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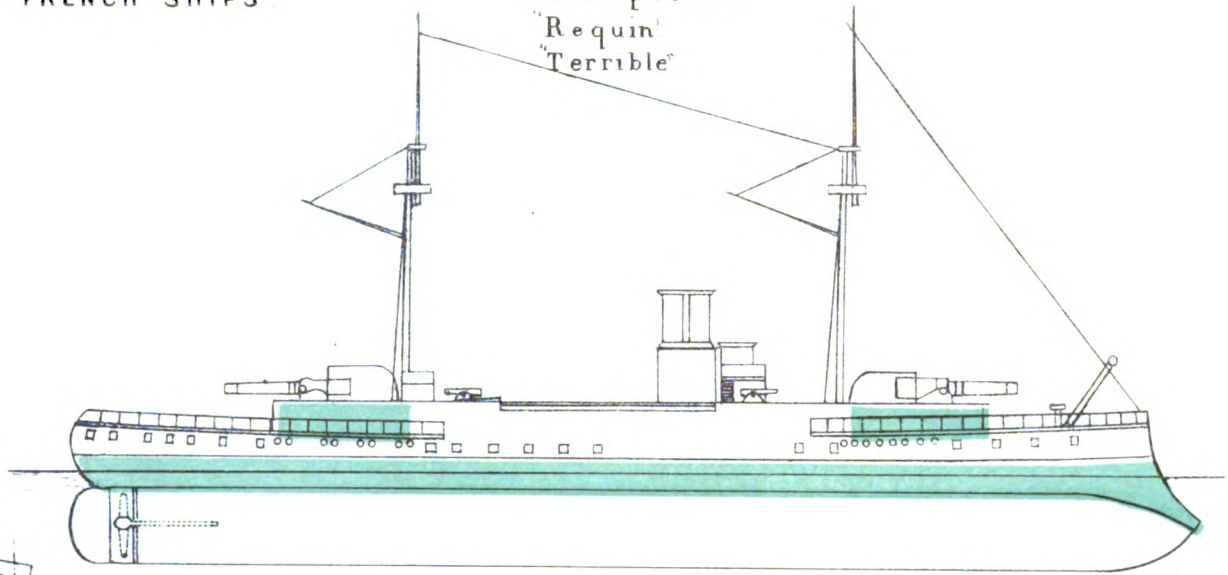
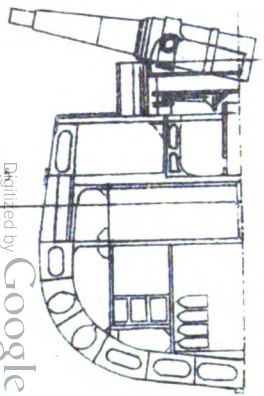
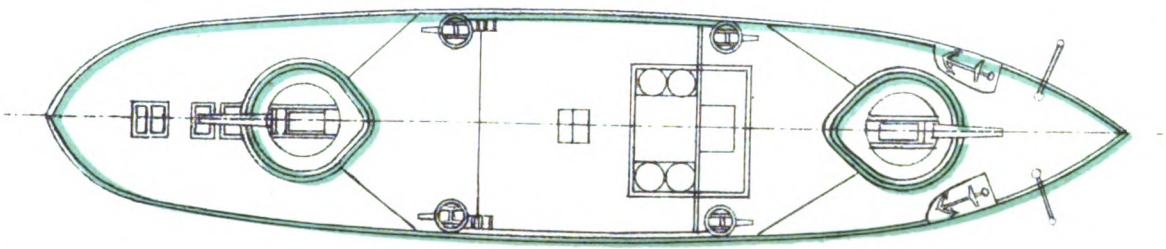
FRENCH SHIPS

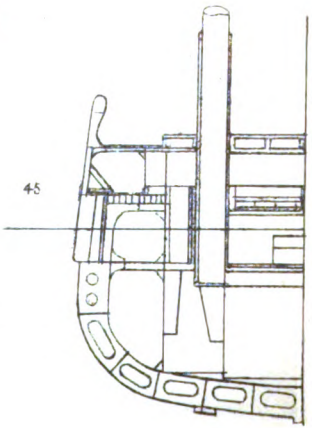
Pl. 42

"Caiman"
"Indomptable"
"Requin"
"Terrible"









HANHART LITH

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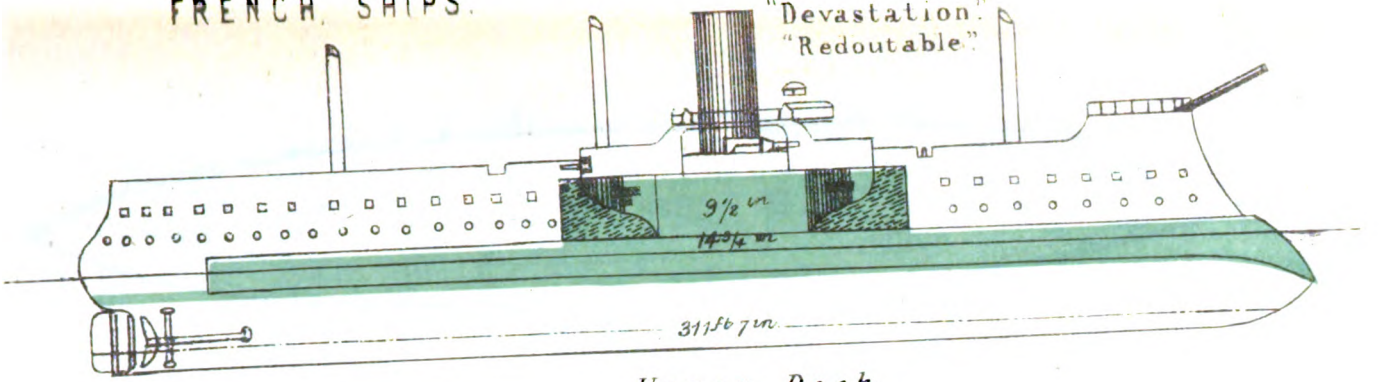
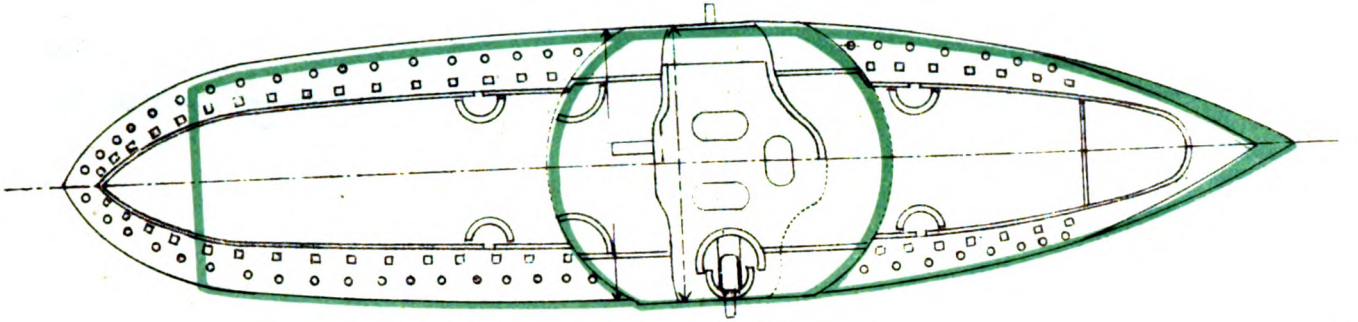
FRENCH SHIPS.

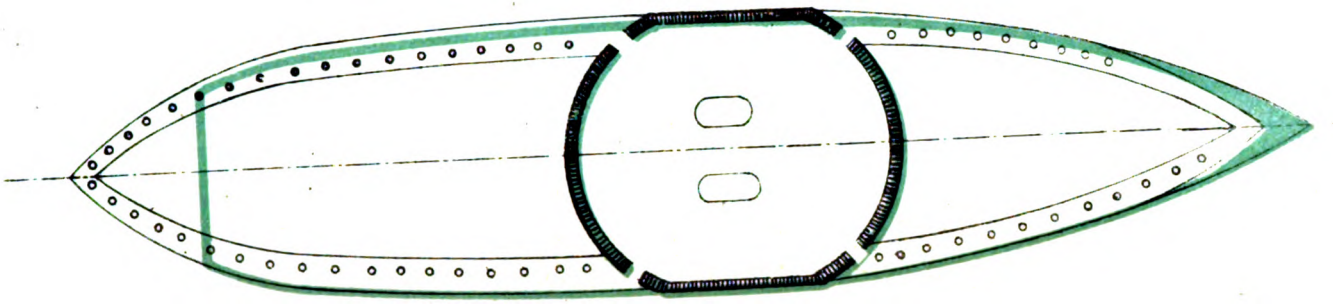
"Courbet."
"Devastation."
"Redoutable."



Upper Deck



Main Deck



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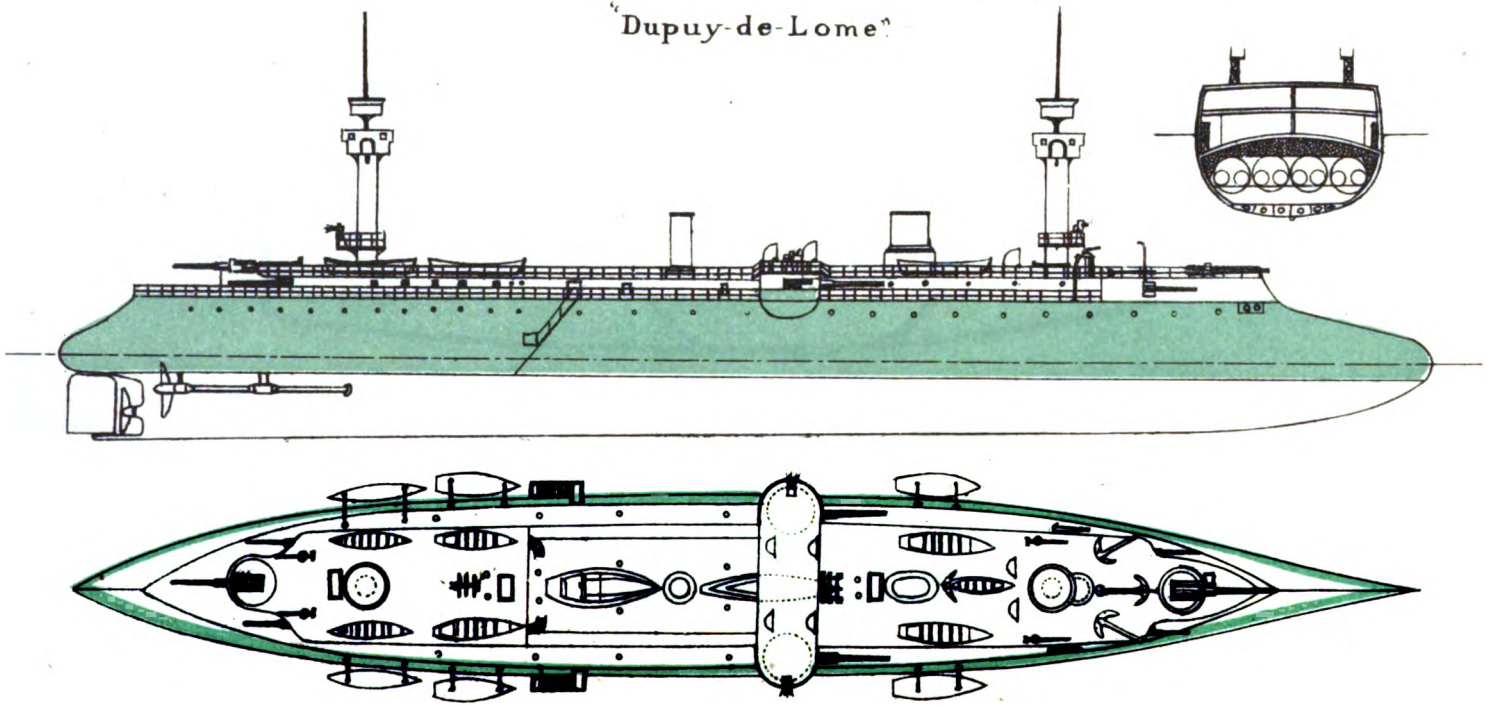
FRENCH SHIPS.

Armoured Cruiser.

"Dupuy-de-Lome"



HANHART LITH.

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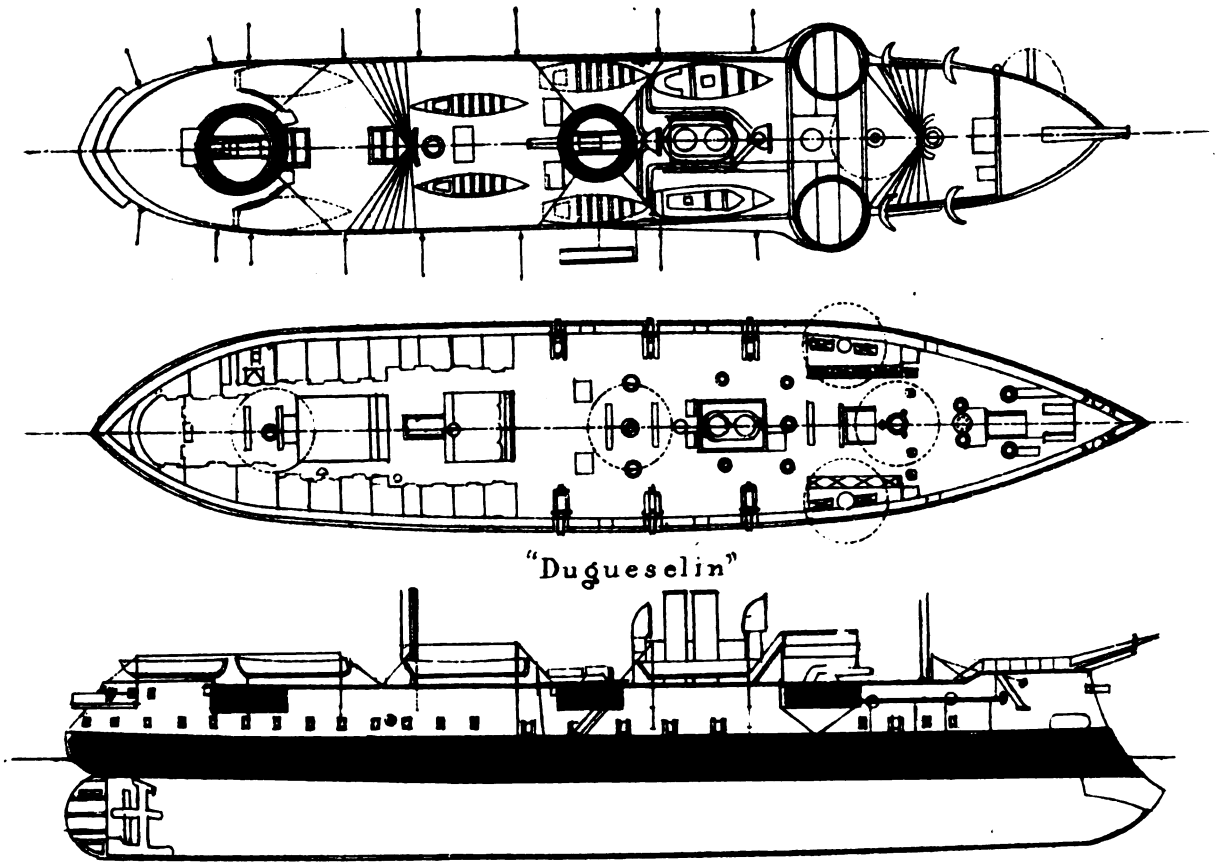
FRENCH SHIPS



"Duguesclin"

MANHART LITH

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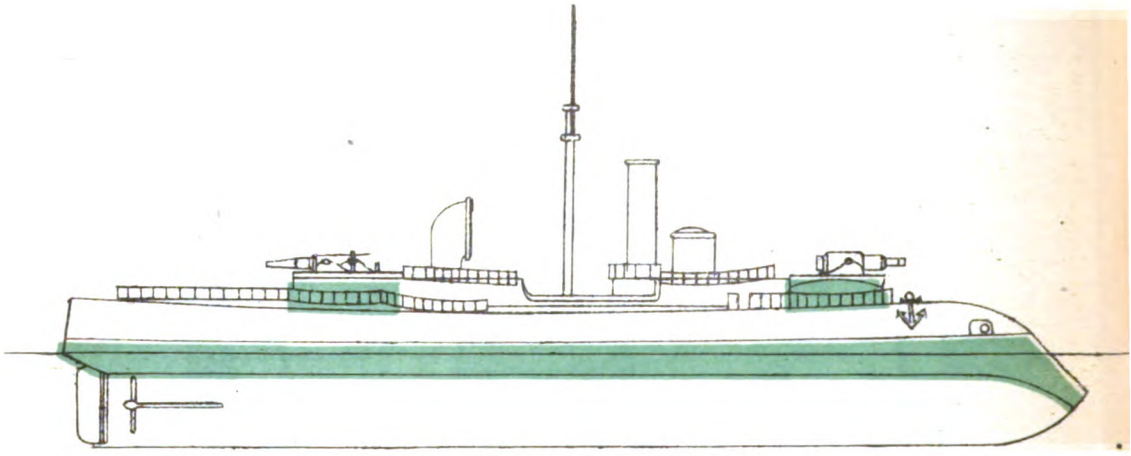
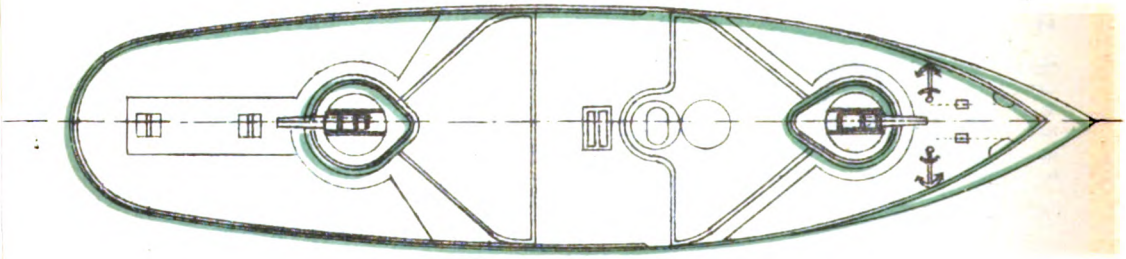
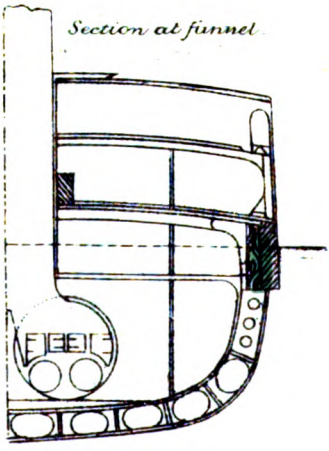
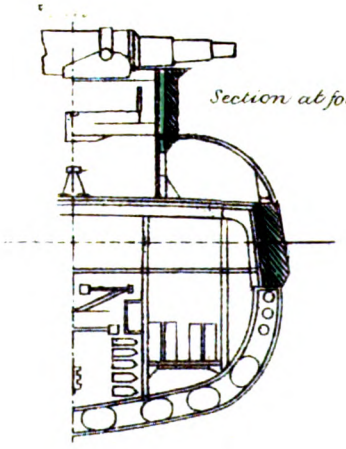
FRENCH SHIPS

Furieux.









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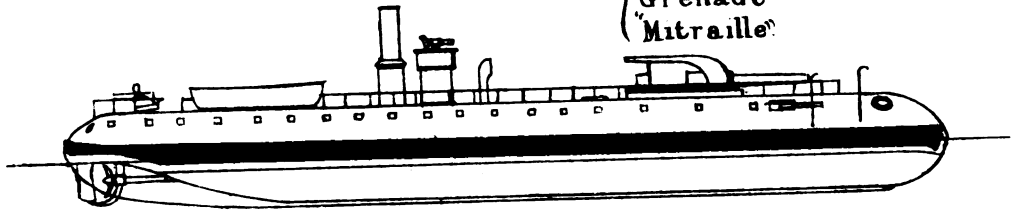
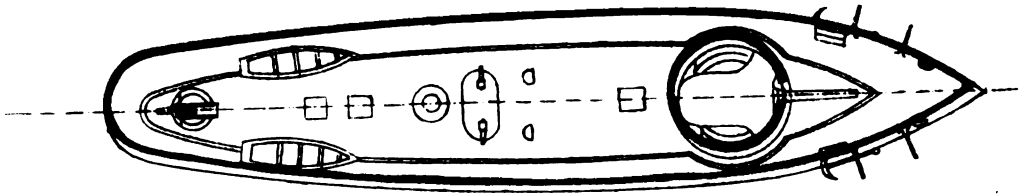
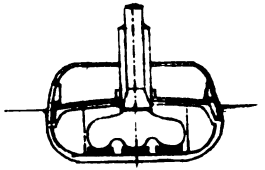
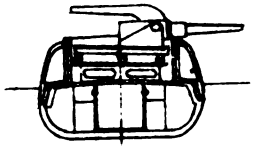
FRENCH SHIPS.

"Fusée" Class. { "Flamme" "Fusée" "Grenade" "Mitraille"









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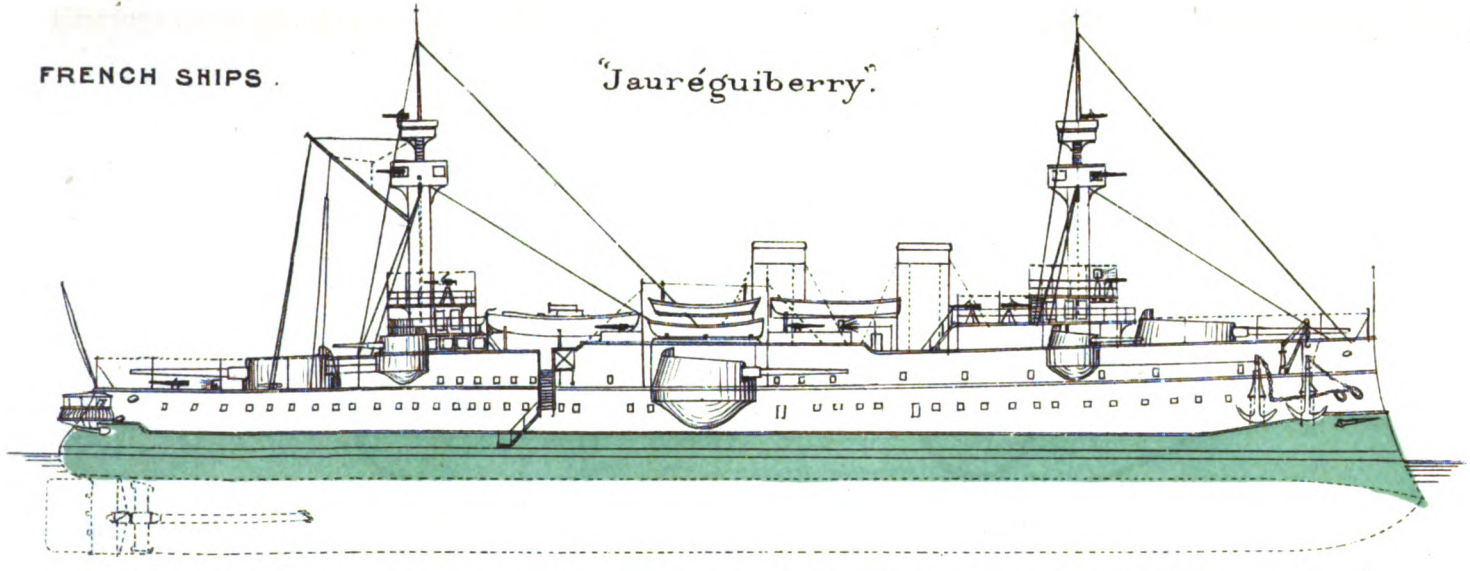
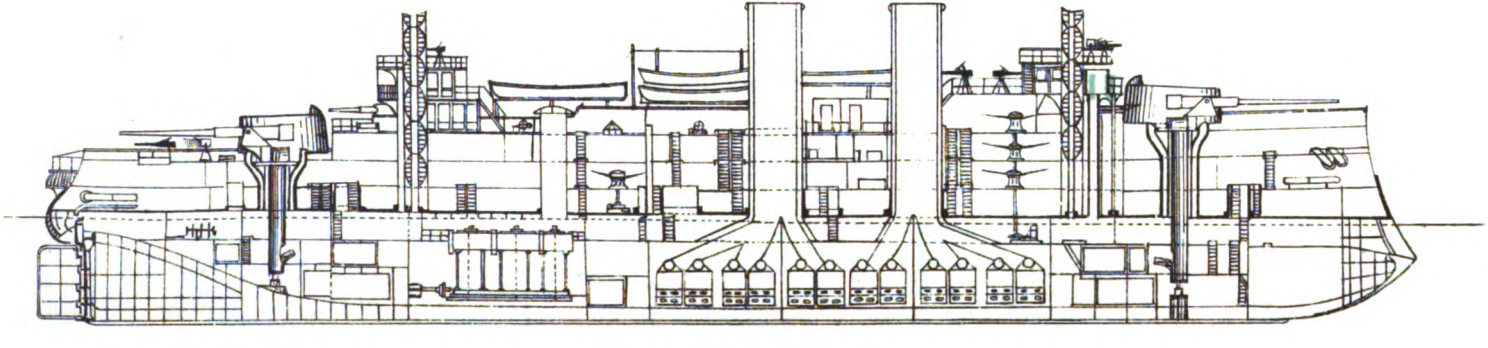
FRENCH SHIPS.

"Jauréguiberry".

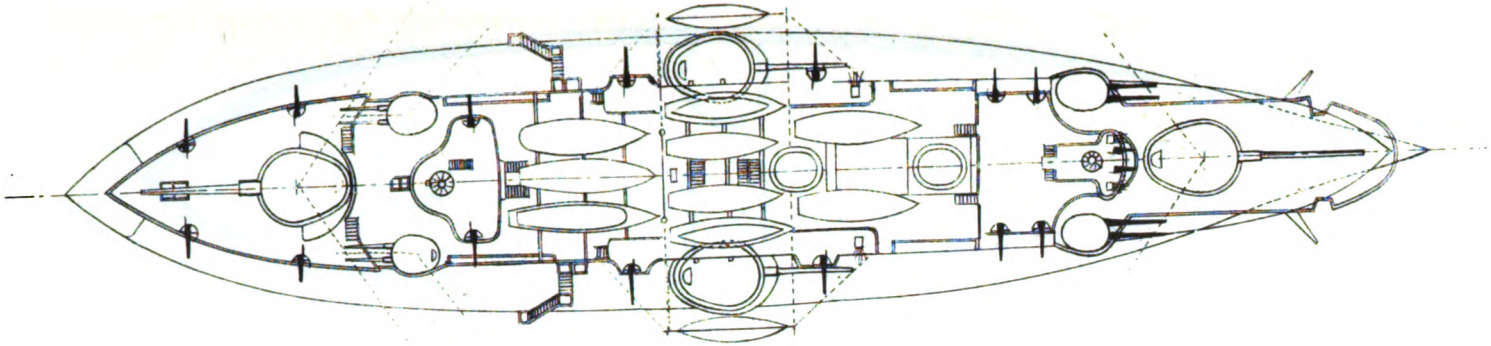


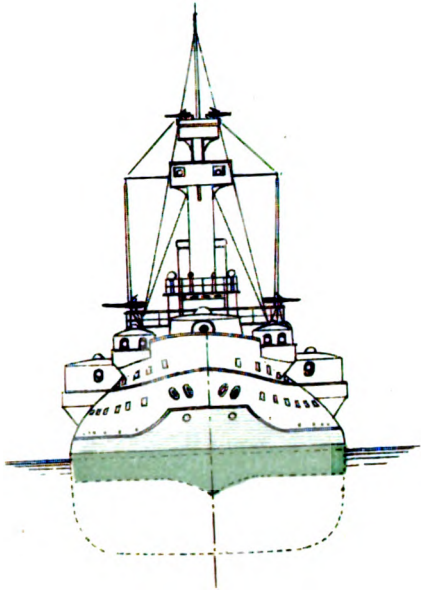


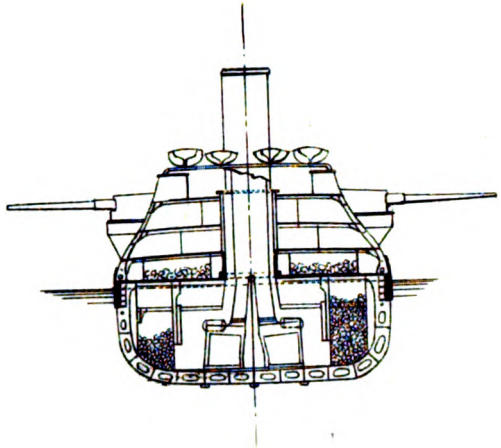
HANHART LITH.

Digitized by Google

"Jauréguiberry."







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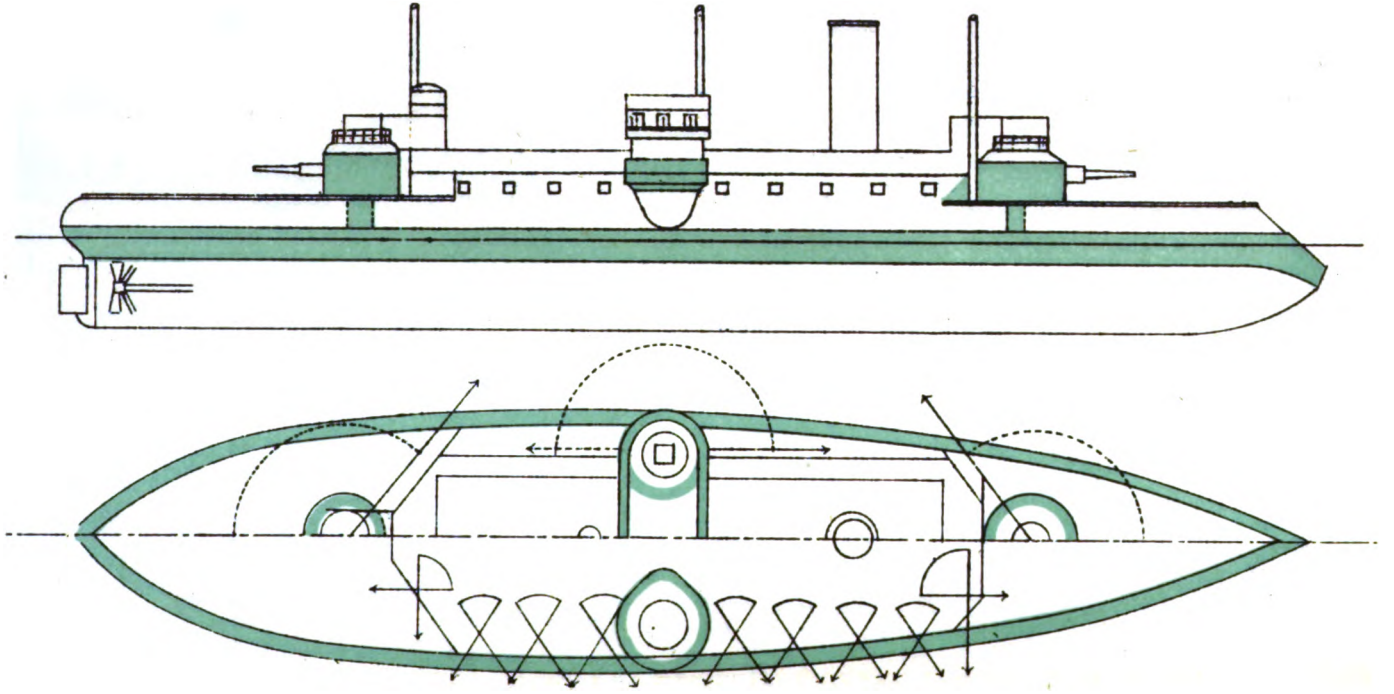
FRENCH SHIPS.

"Hoche".



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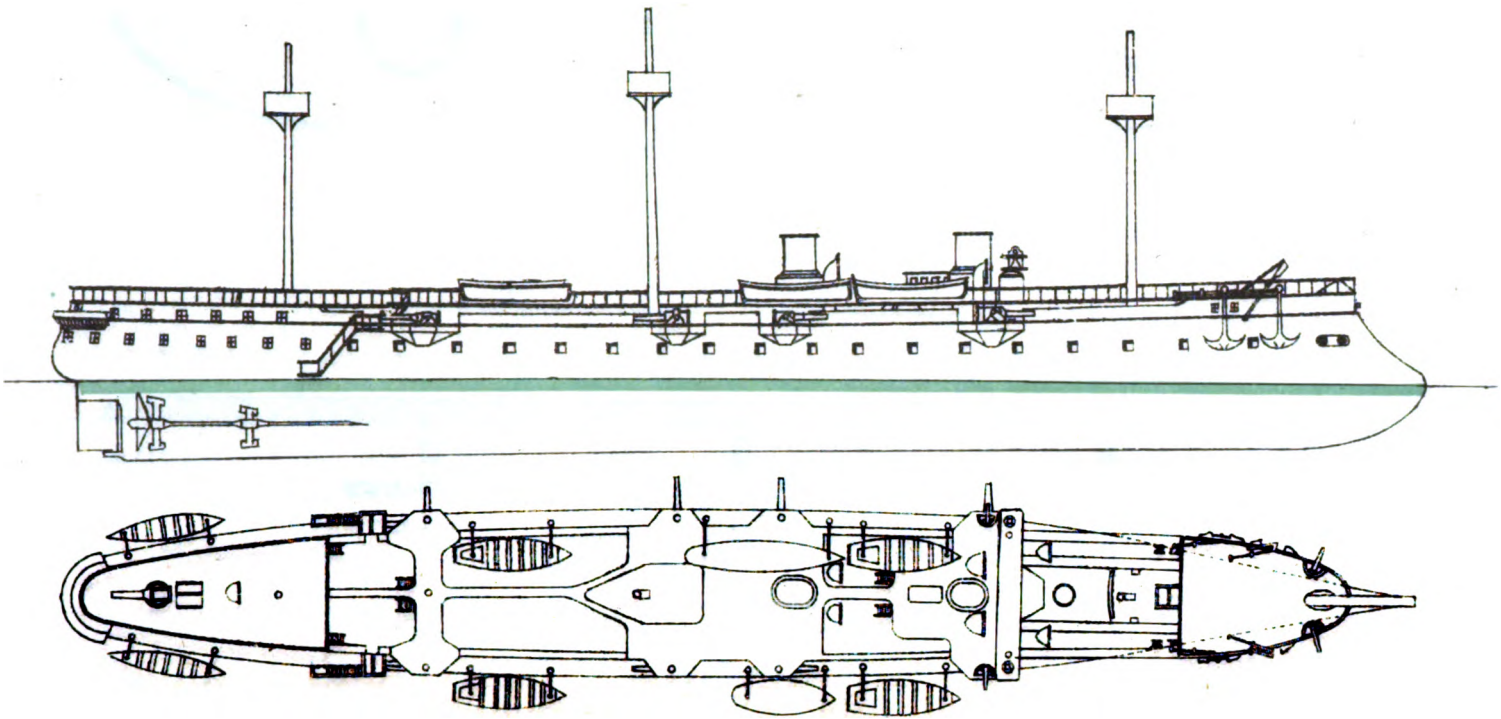
Protected Cruiser.

"Jean-Bart"
"Alger"
"Isly"



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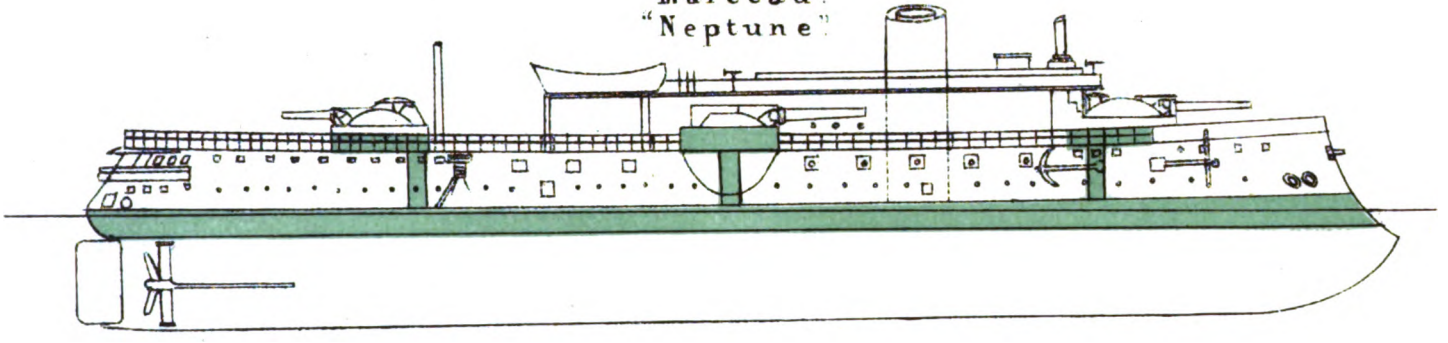
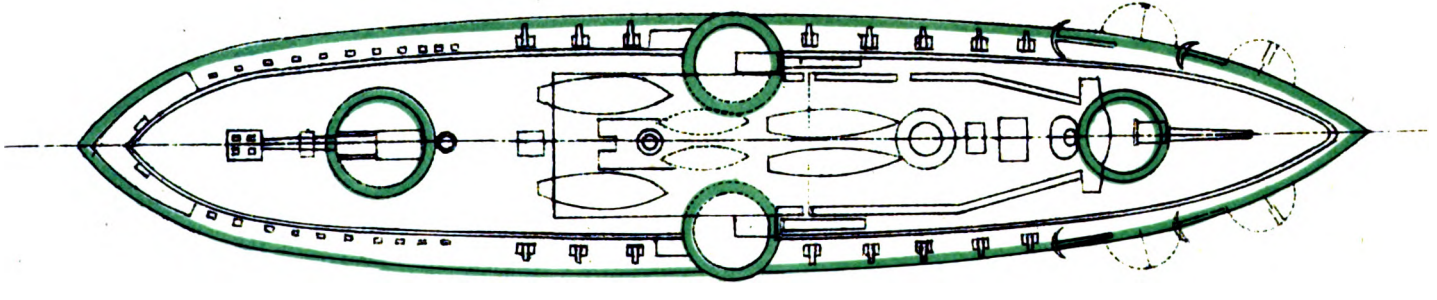
FRENCH SHIPS

"Magenta"
"Marceau"
"Neptune"





MANHART LITH.

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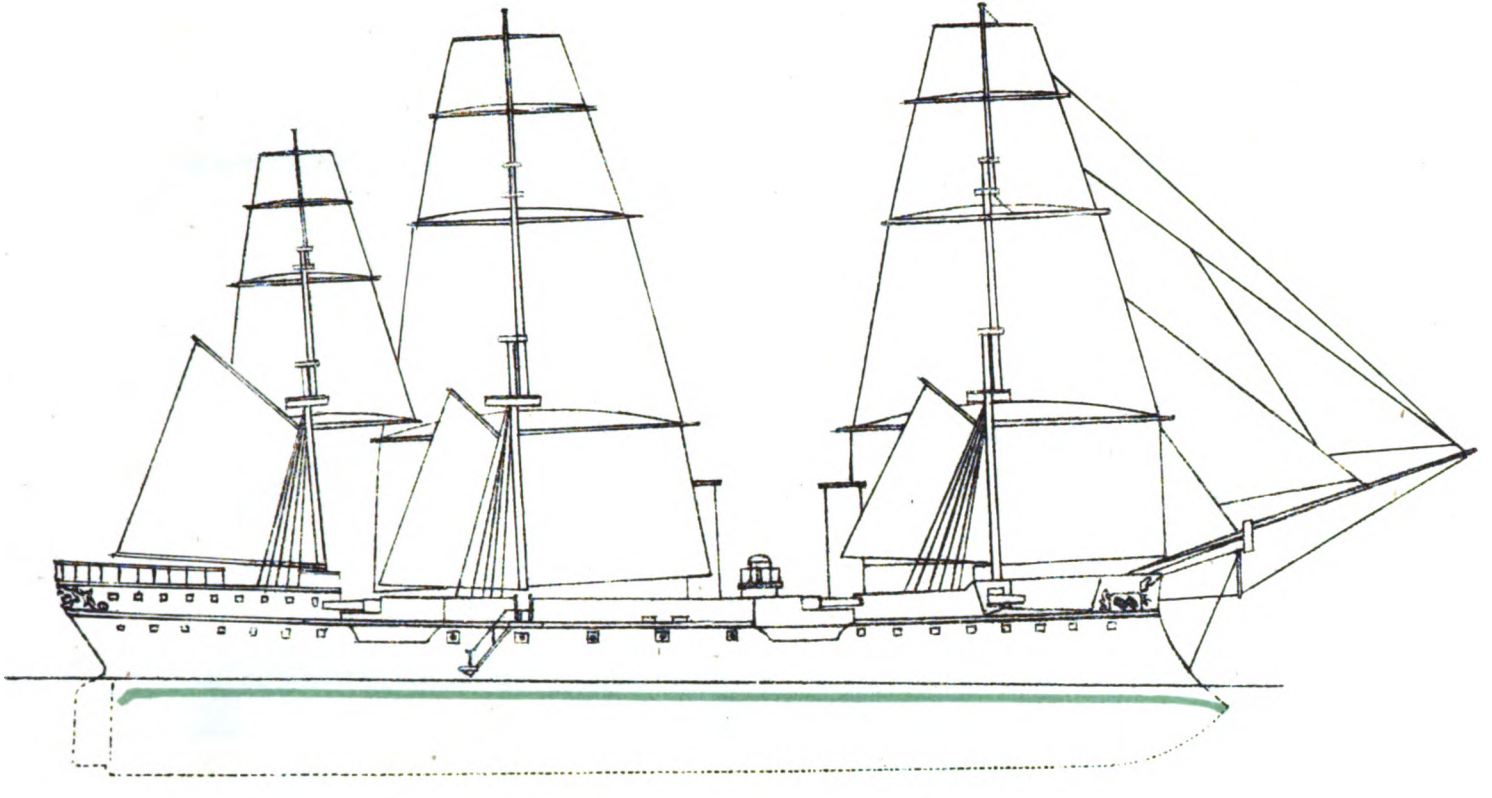
FRENCH SHIPS

"Sfax" (Cruiser)



HANHART LITH

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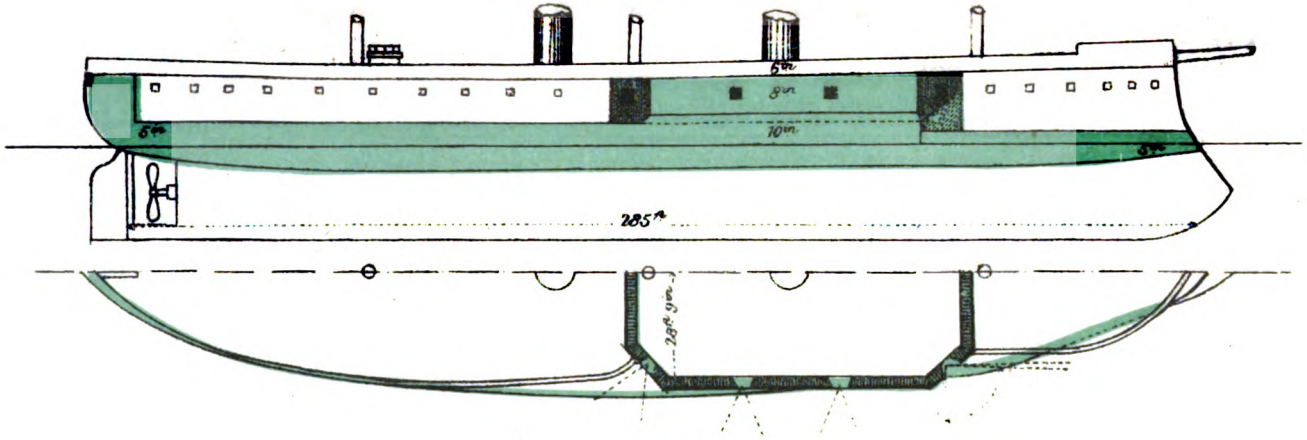
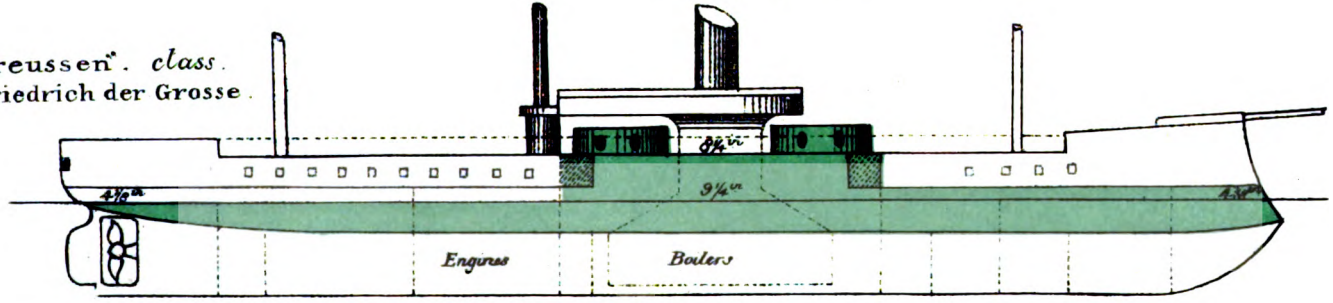
GERMAN SHIPS.

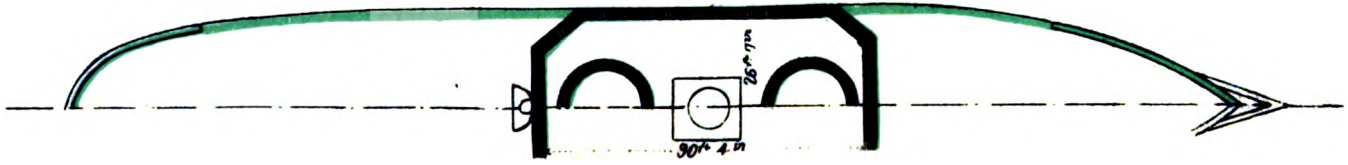
Pl. 54

"Kaiser"
"Deutschland"



"Preussen". class.
Friedrich der Grosse.





HANHART LITH

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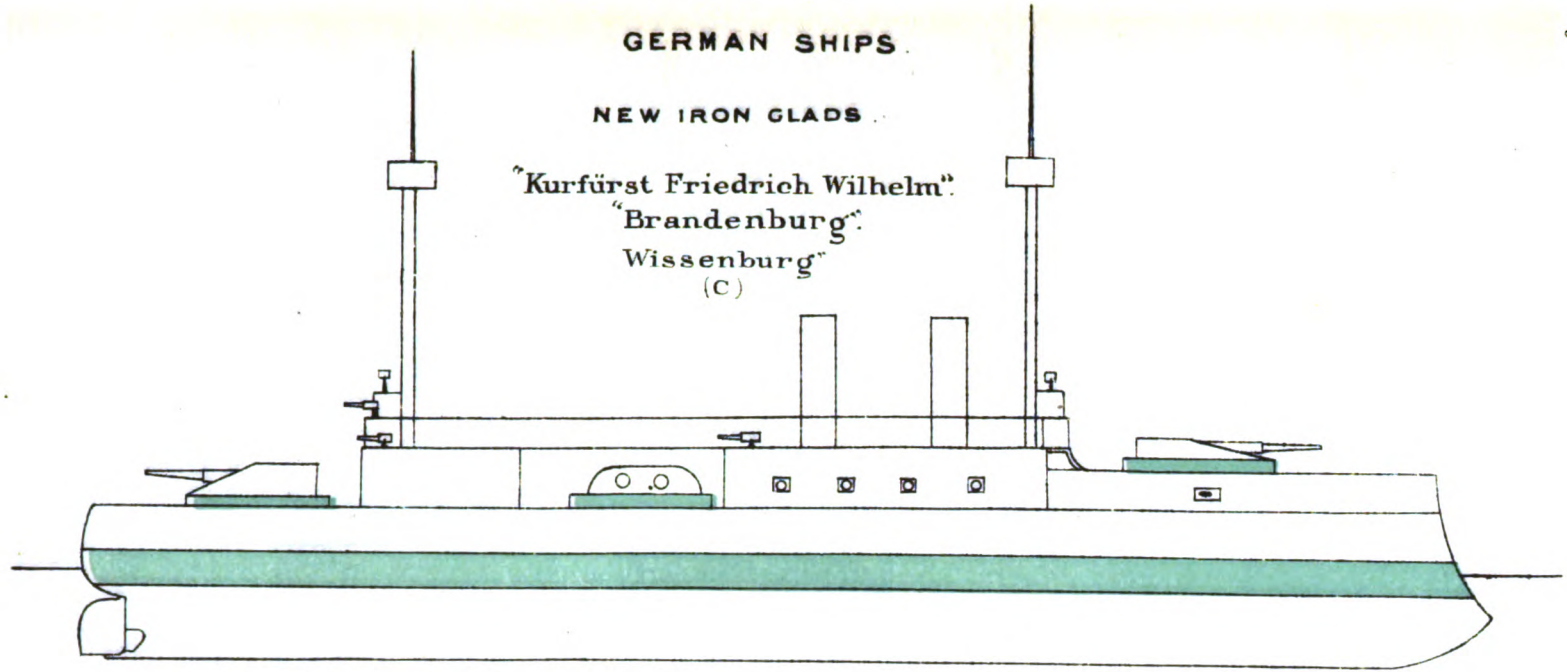
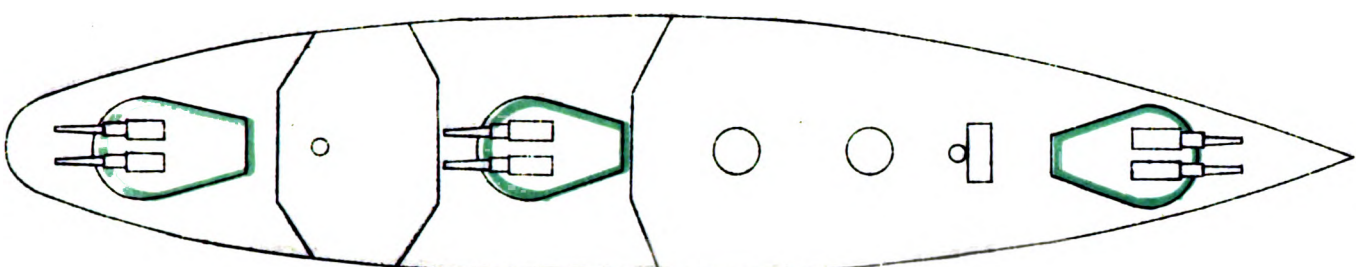
GERMAN SHIPS.

NEW IRON CLADS.

"Kurfürst Friedrich Wilhelm".
"Brandenburg".
Wissenburg"
(C)





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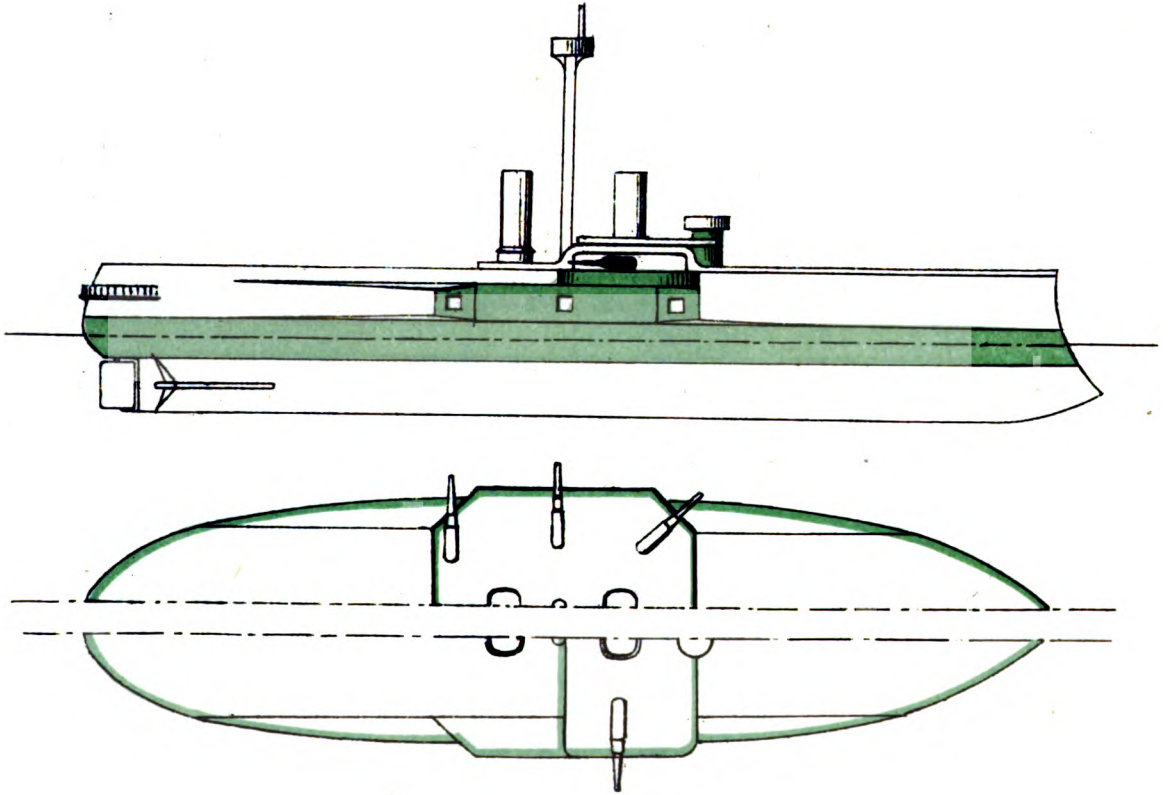
GERMAN SHIPS.

"Oldenburg"



HANNART LITH.

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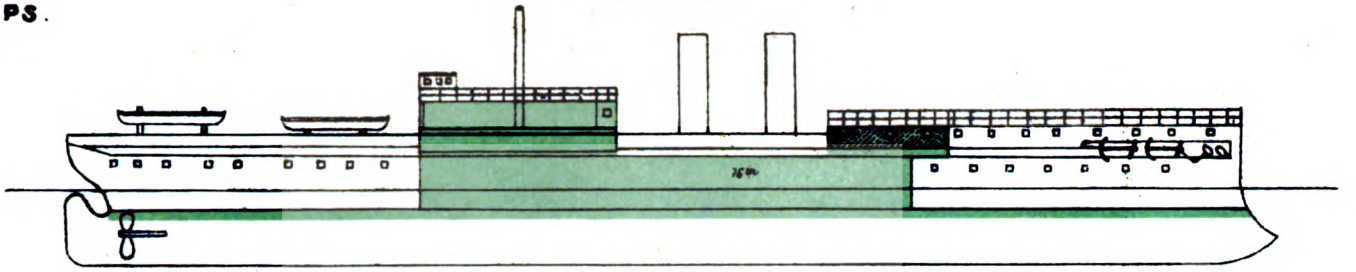
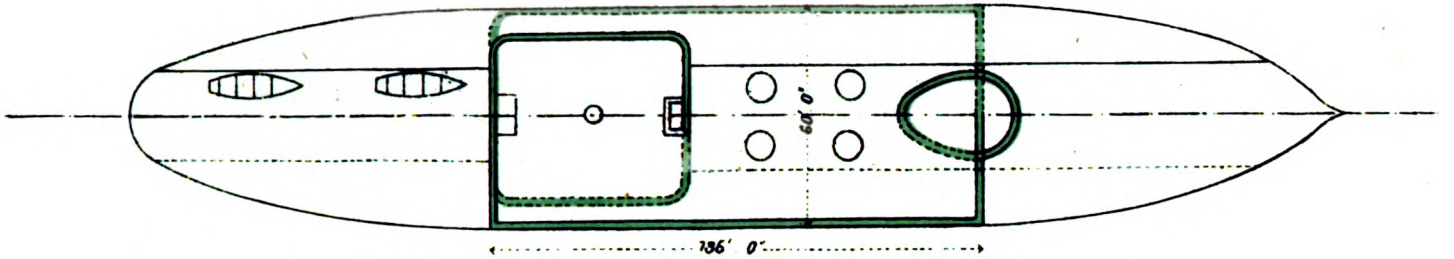
GERMAN SHIPS.

"Sachsen"

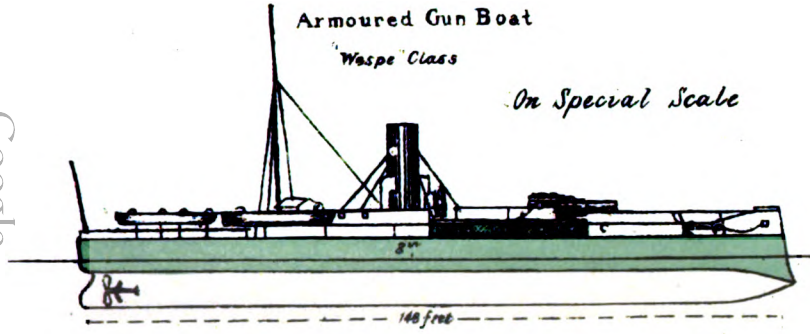


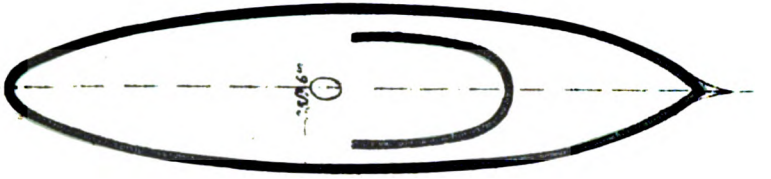


Armoured Gun Boat

"Wespe" Class

On Special Scale





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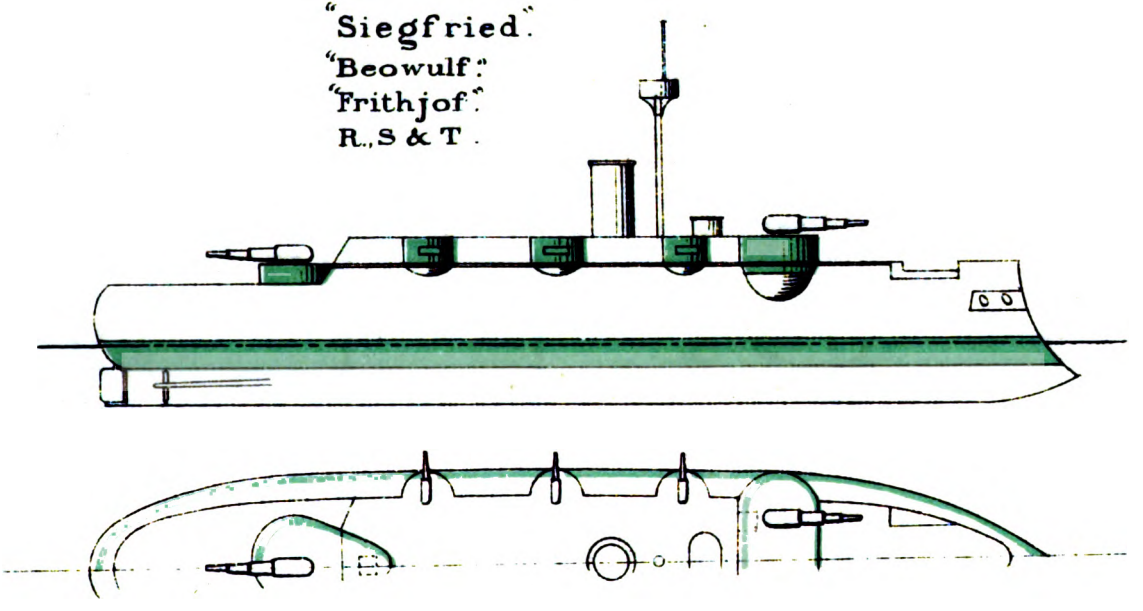
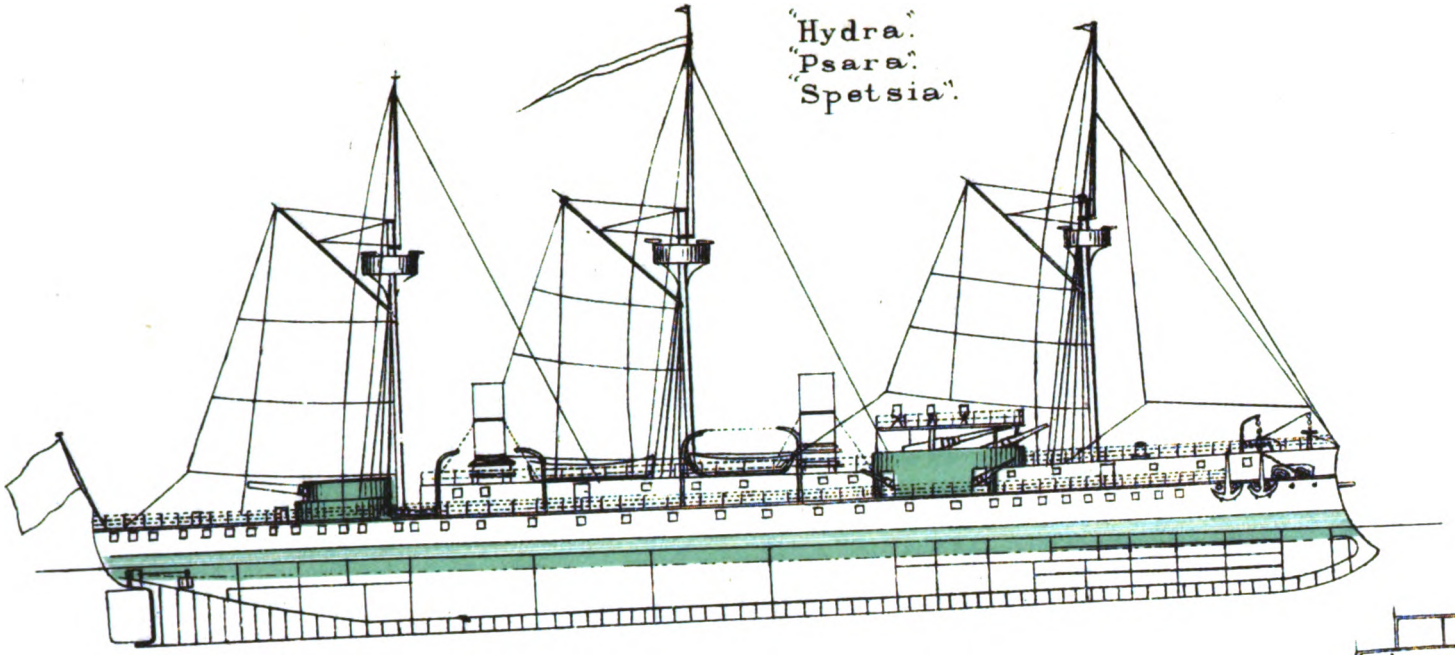
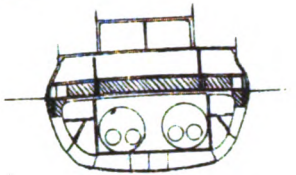
GERMAN SHIPS.



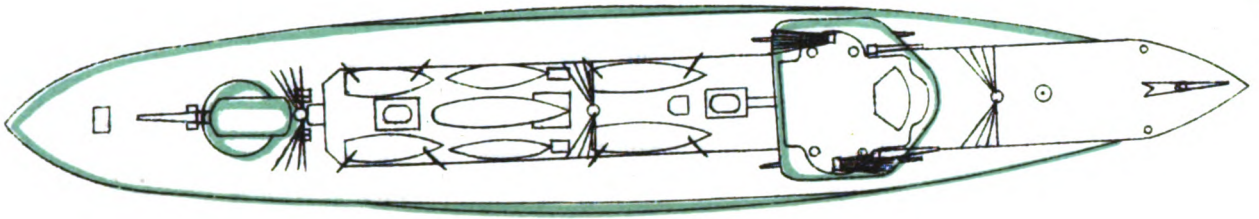
HANHART LTH.

Digitized by Google





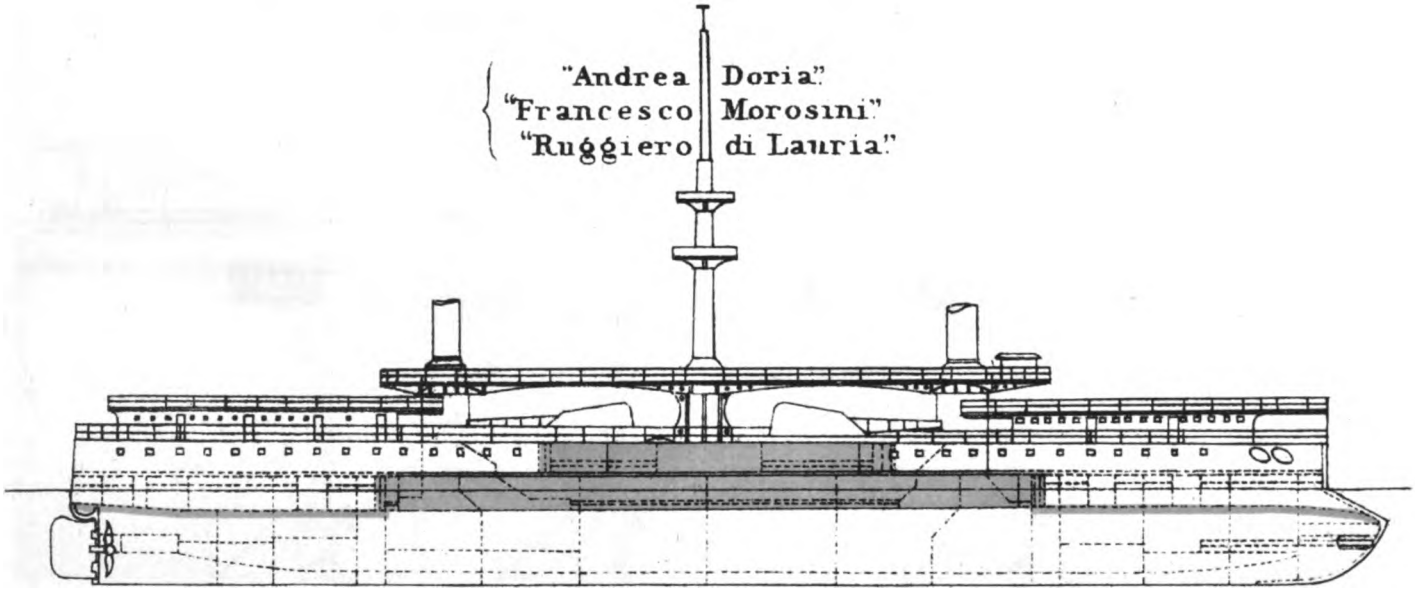
Midship section.



Upper Deck.

Digitized by Google

ITALIAN SHIPS.



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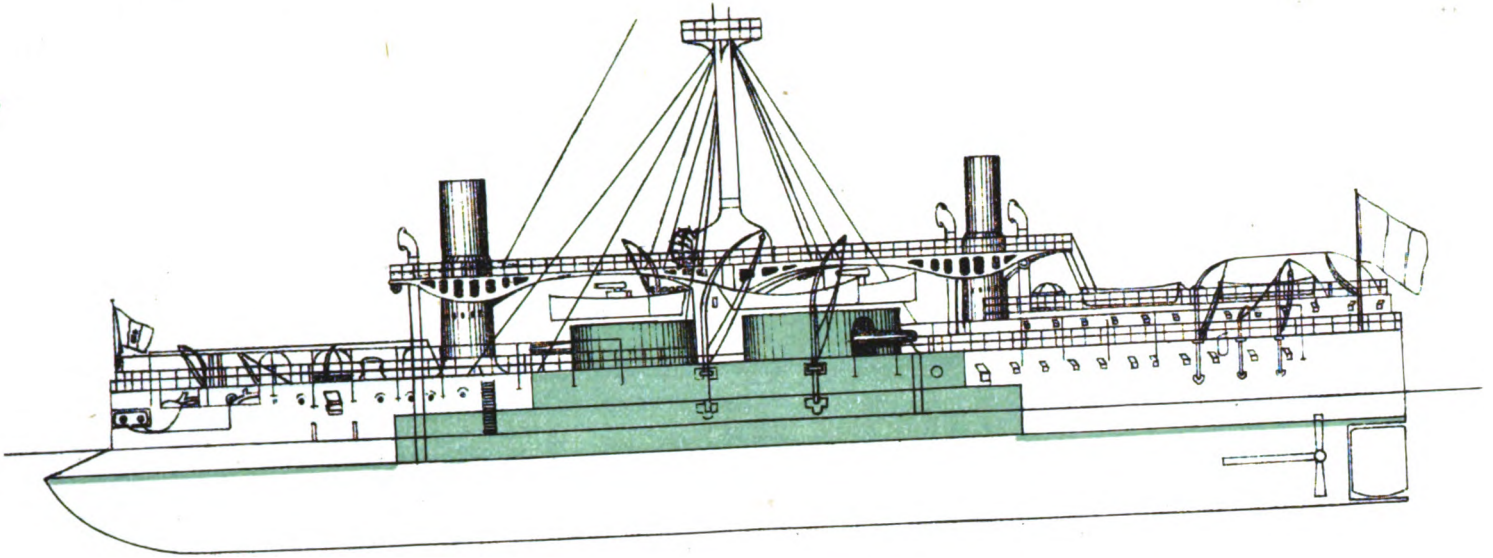
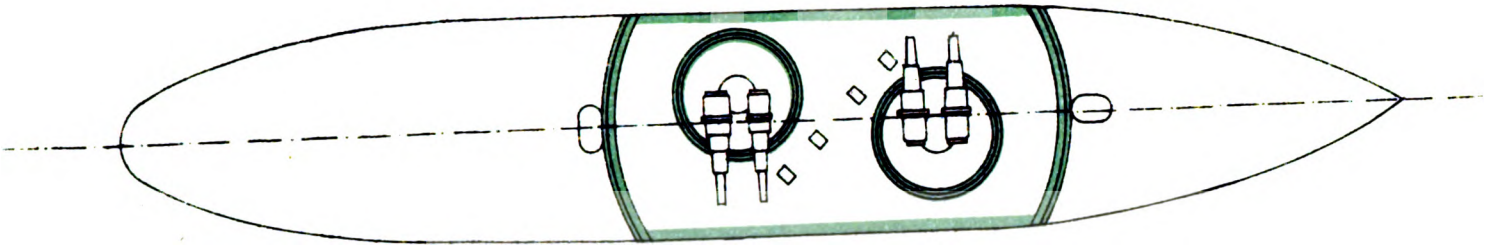
"Duilio"
"Dandolo"



Deck Plan

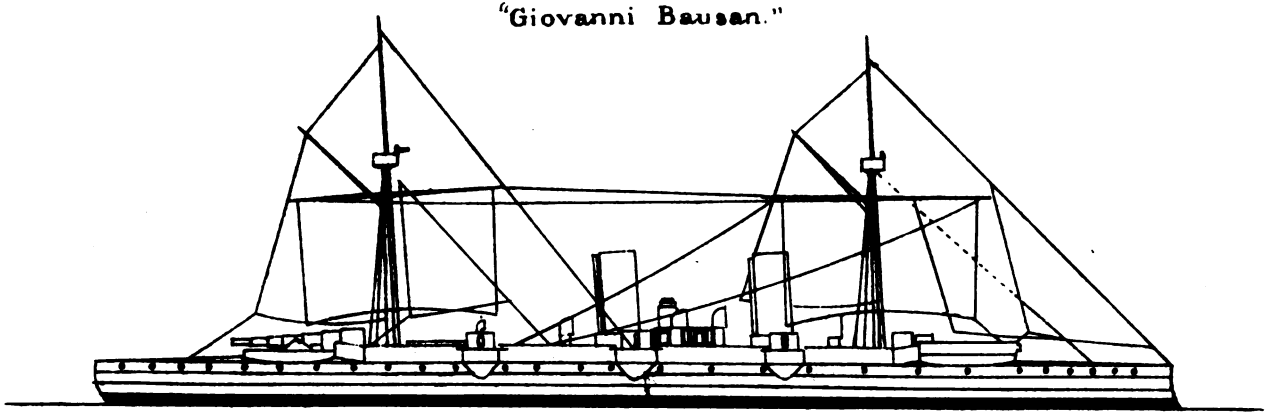


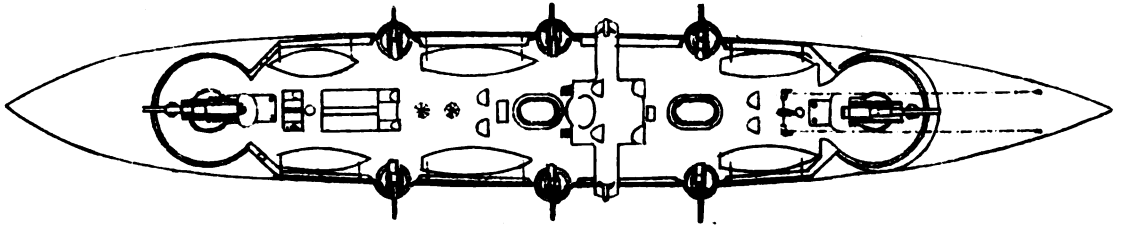
HANHART LITH.

Digitized by Google

ITALIAN SHIPS.

"Giovanni Bausan."

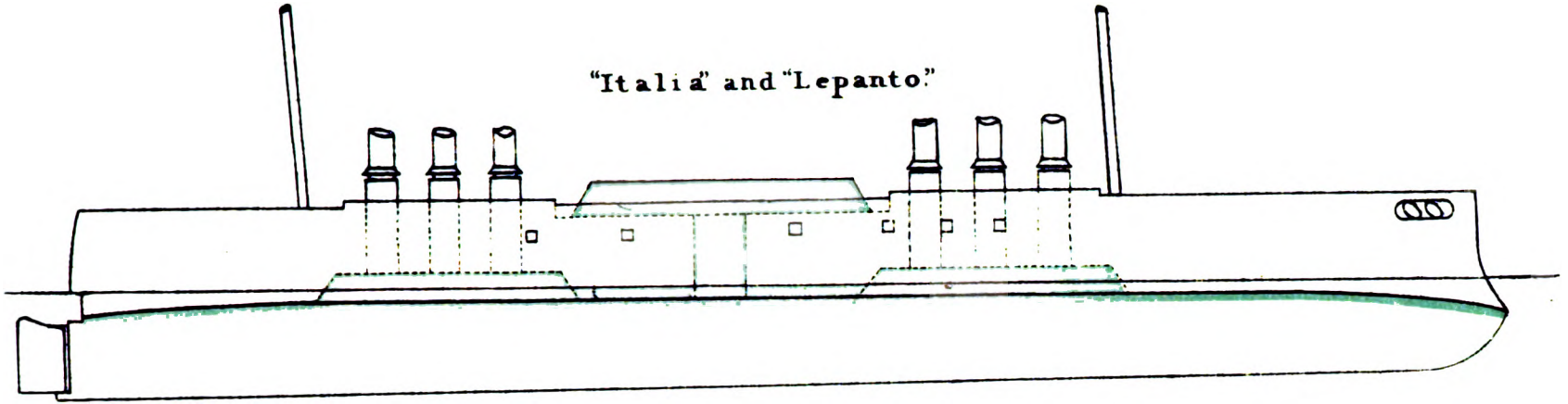




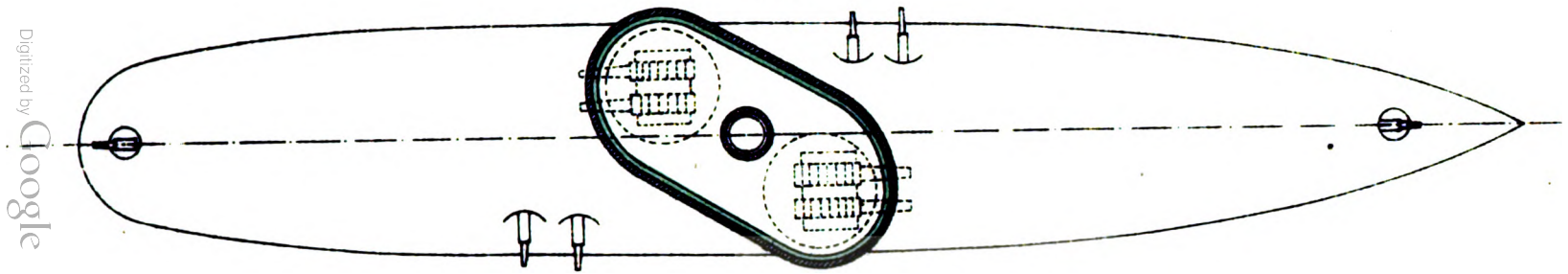
Digitized by Google

ITALIAN SHIPS.

"Italia" and "Lepanto."



Upper Deck.



HANHART LITH.

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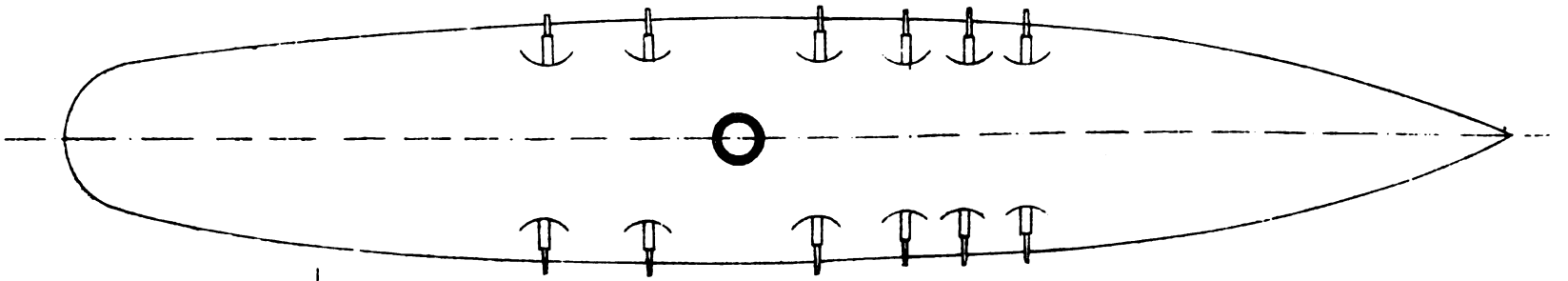
ITALIAN SHIPS.

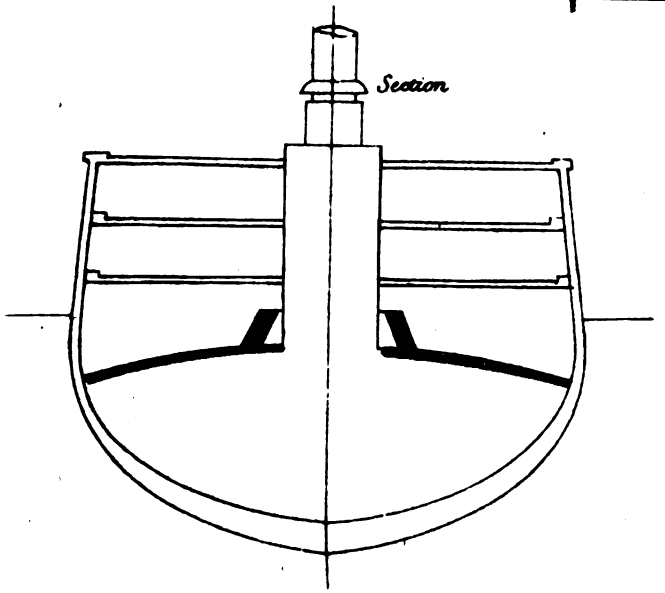
"Italia."

Pl. 64.

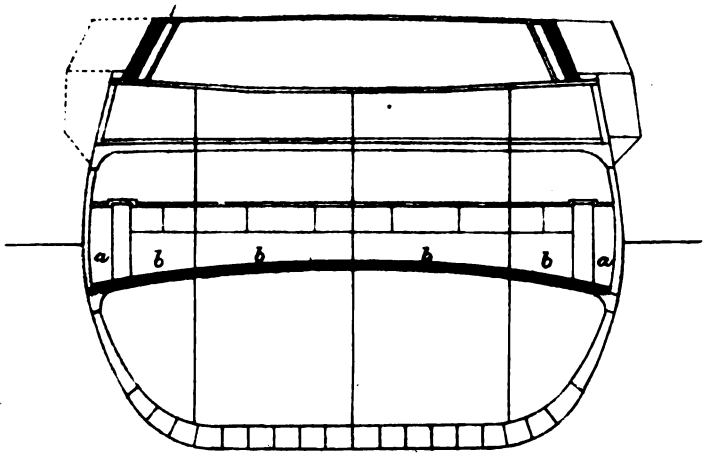
Main Deck.



Section



Section.



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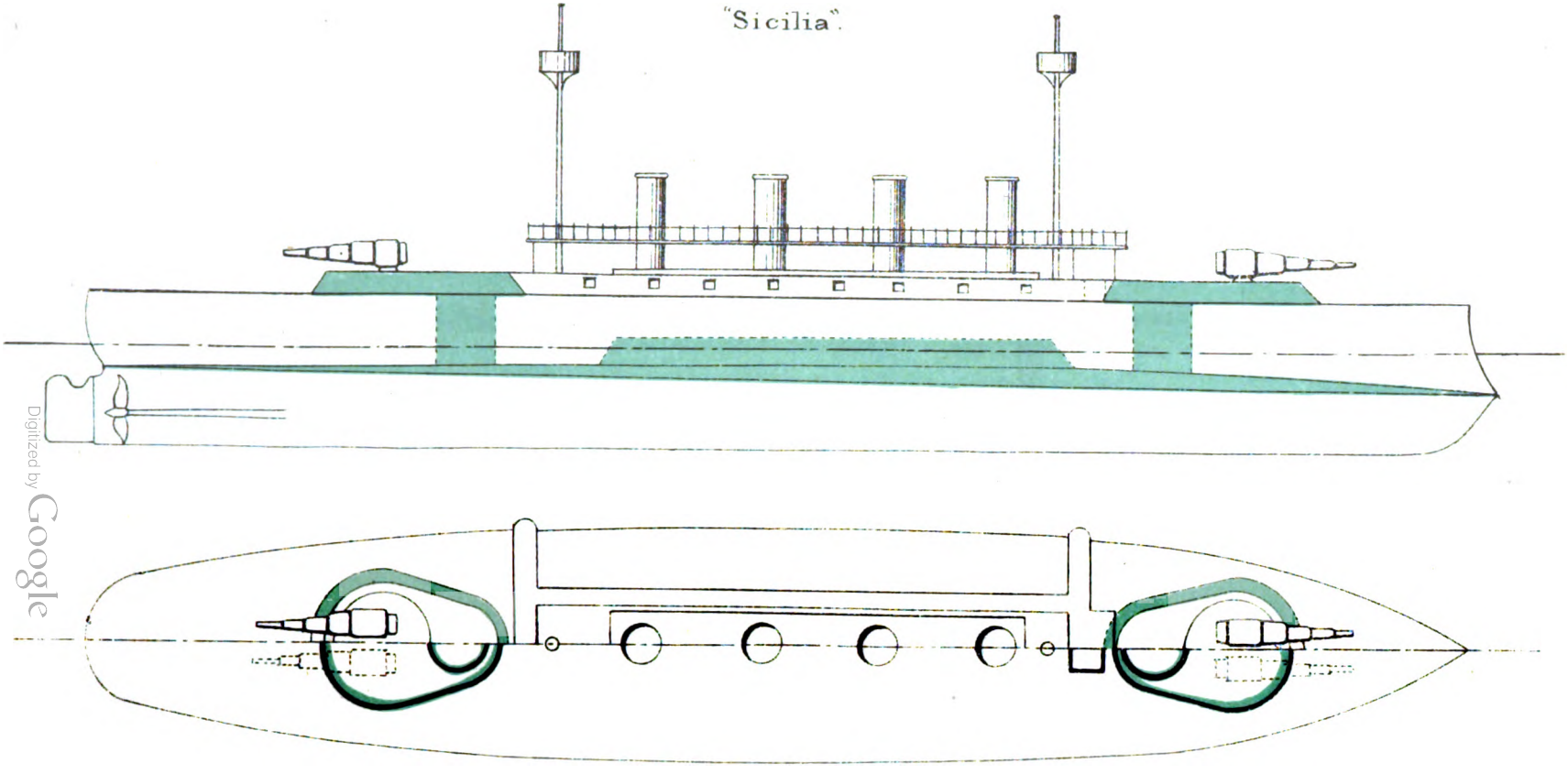
ITALIAN SHIPS.

"Sicilia".



HANHART LITH

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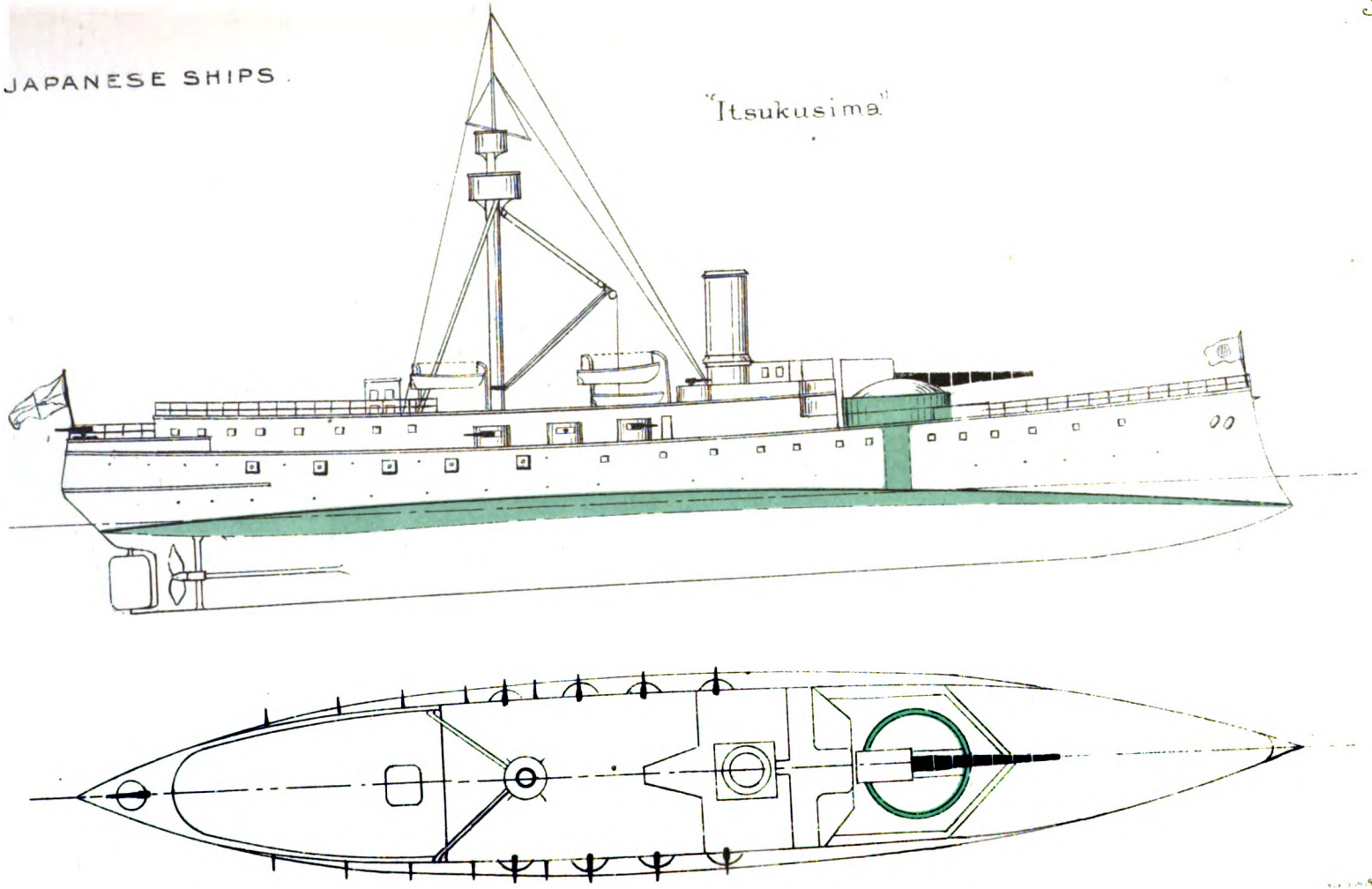
JAPANESE SHIPS.

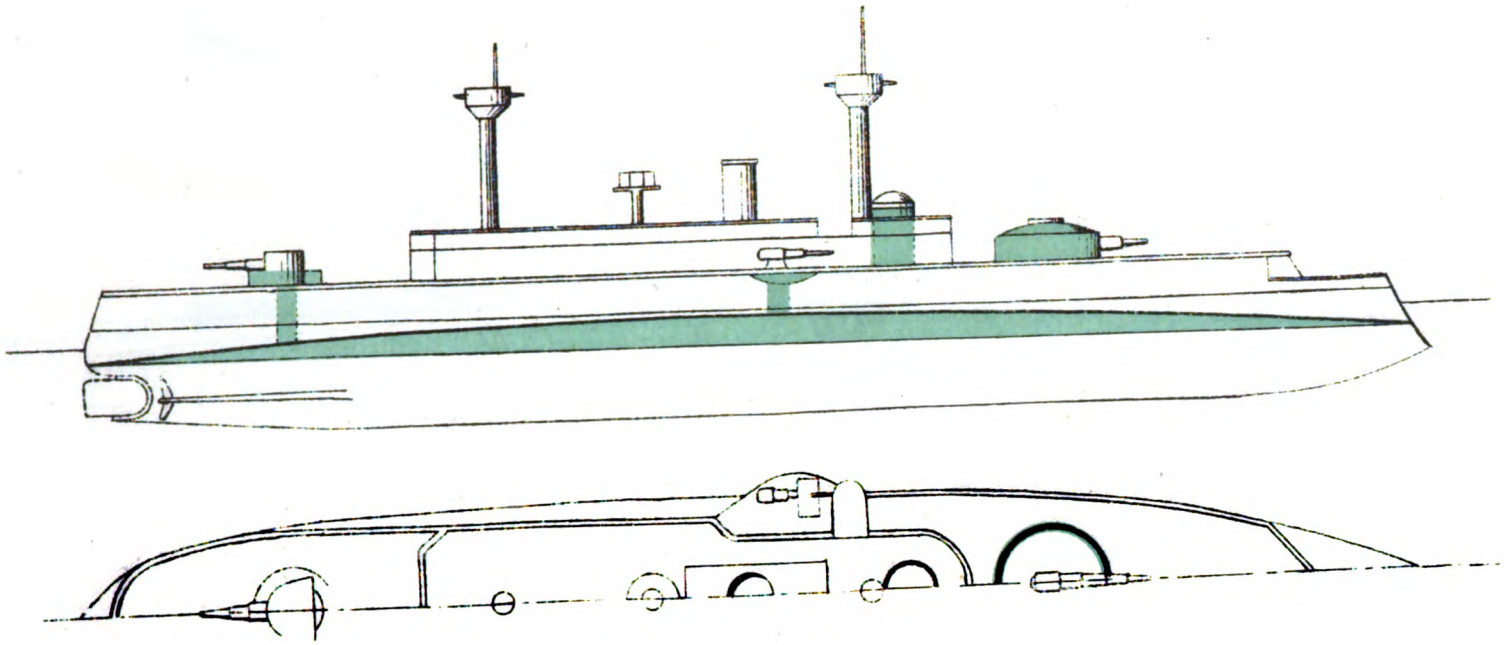
"Itsukusima."



Digitized by Google

NETHERLAND SHIPS.

"Princess Wilhelmina".



HANHART LITH.

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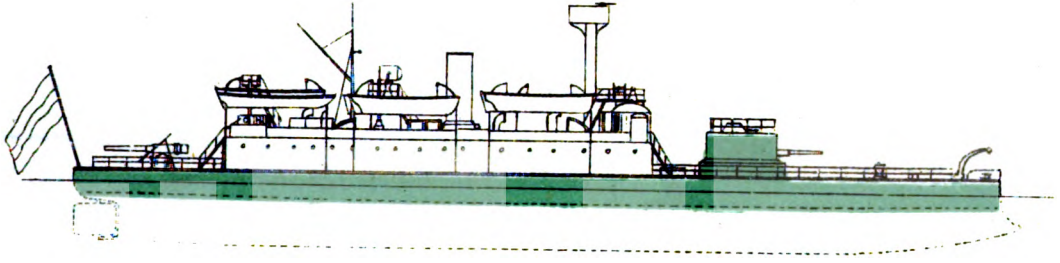
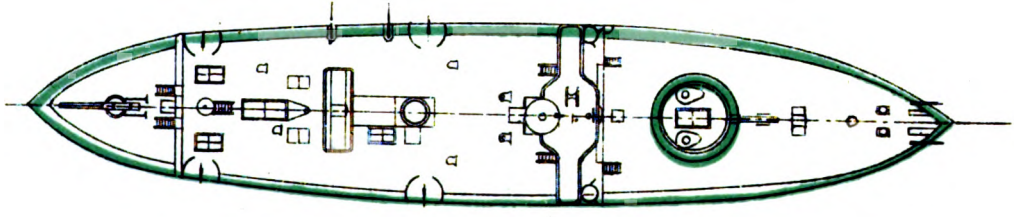
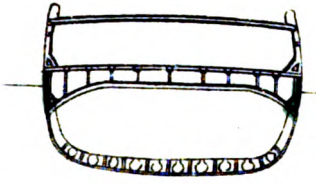
NETHERLANDS SHIPS.

"Reinier Claesen".





MIDSHIP SECTION.



On Special Scale.

MANHART LITH.

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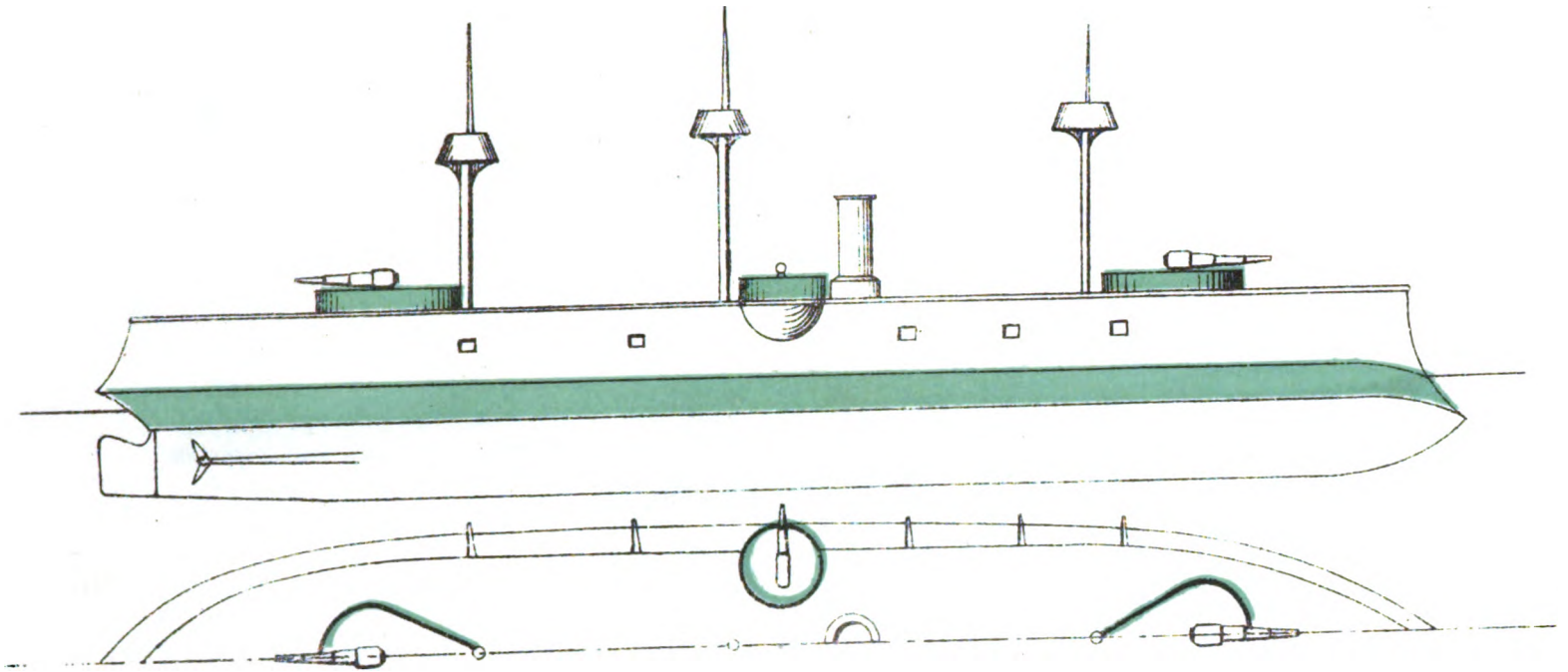
RUSSIAN SHIPS.

"Admiral Nachimoff".



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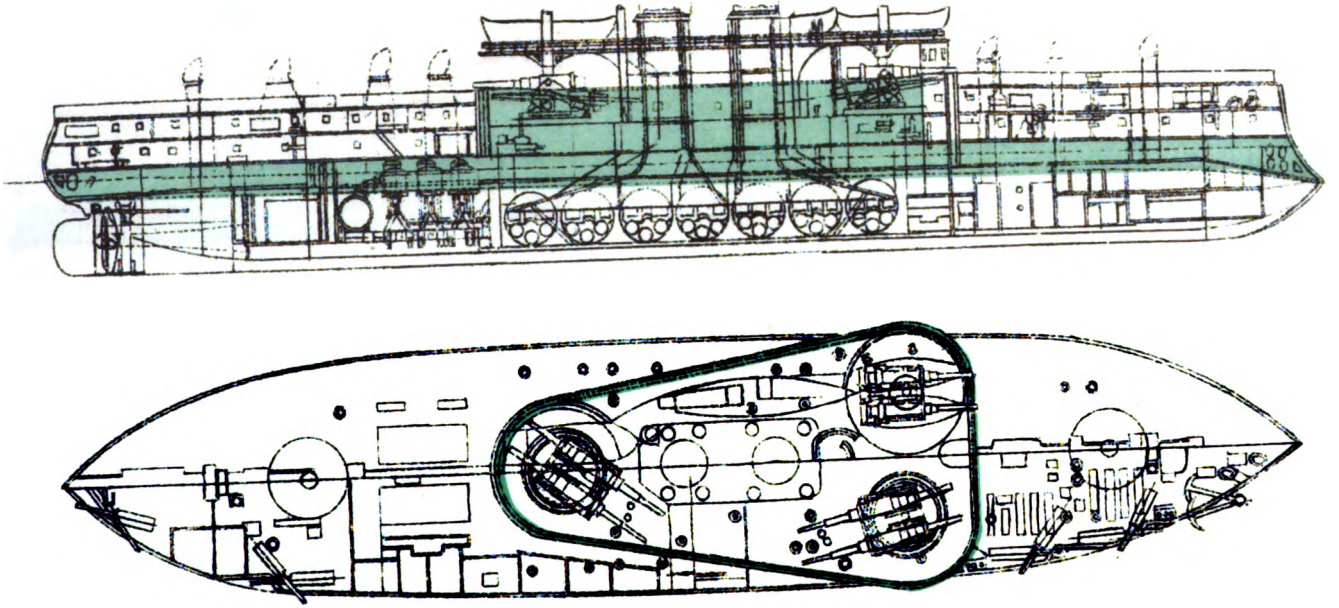
RUSSIAN SHIPS



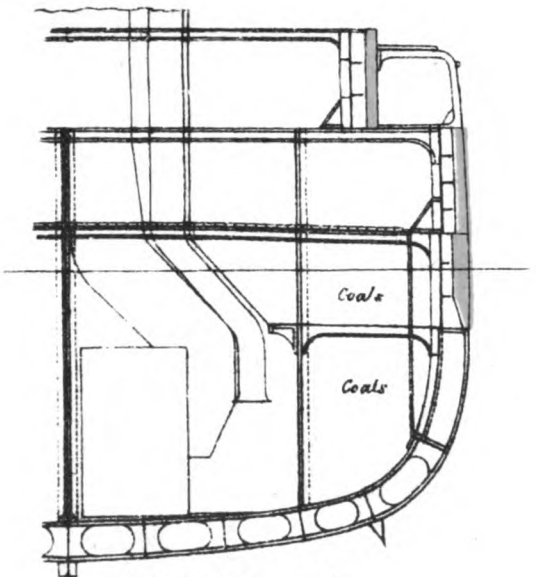
"Catherine II"
"Tchesme"
"Sinope"

HANHART LITH

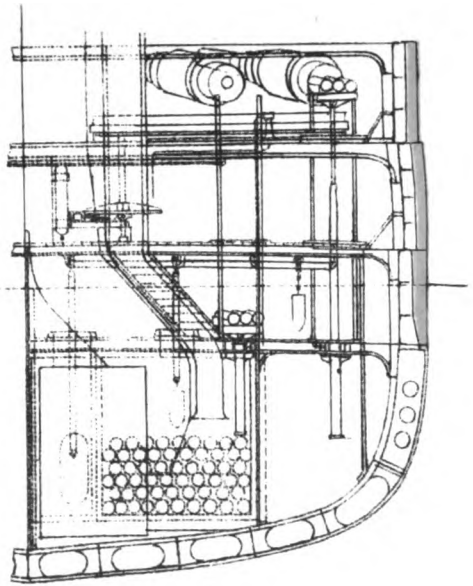
Digitized by Google

"Tchesme"
"Sinope"
"Catherine II"

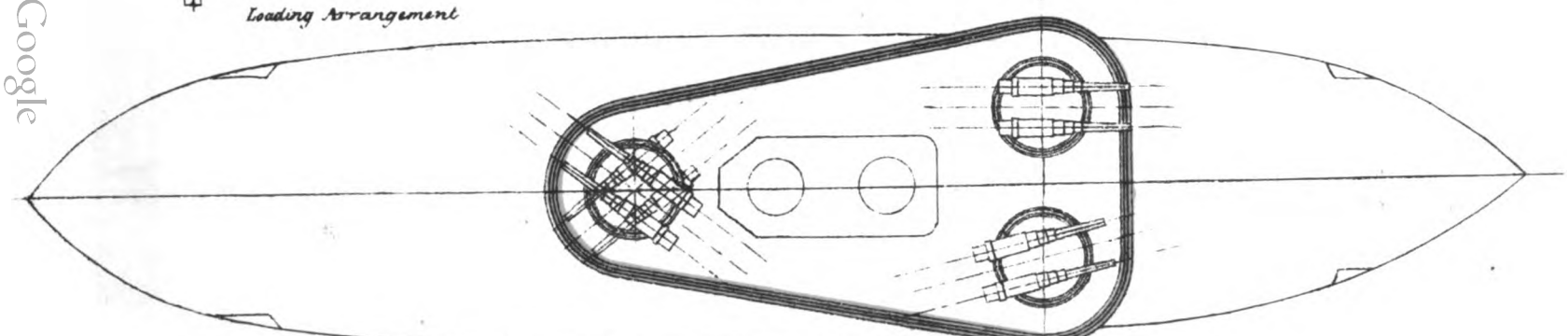
RUSSIAN SHIPS



Loading Arrangement



On Special Scale

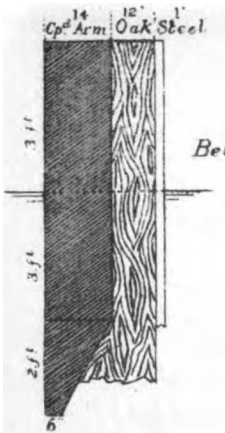


"Catherine II"

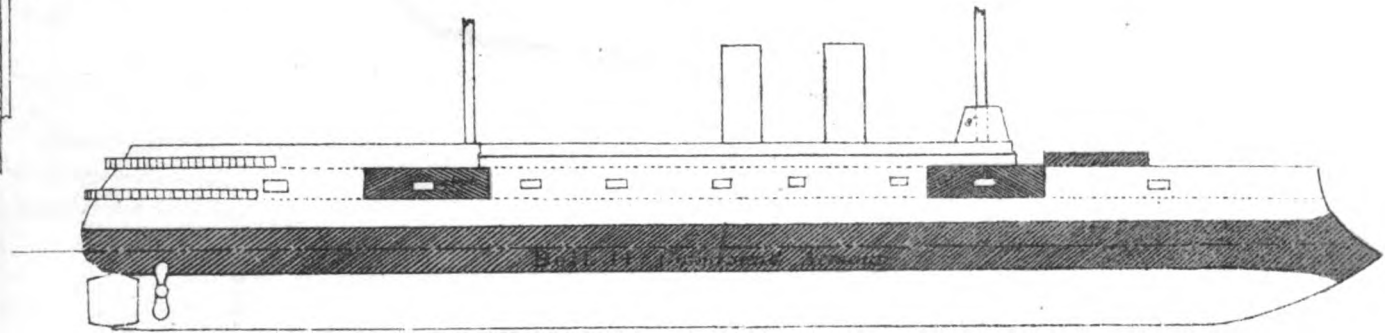
Digitized by Google

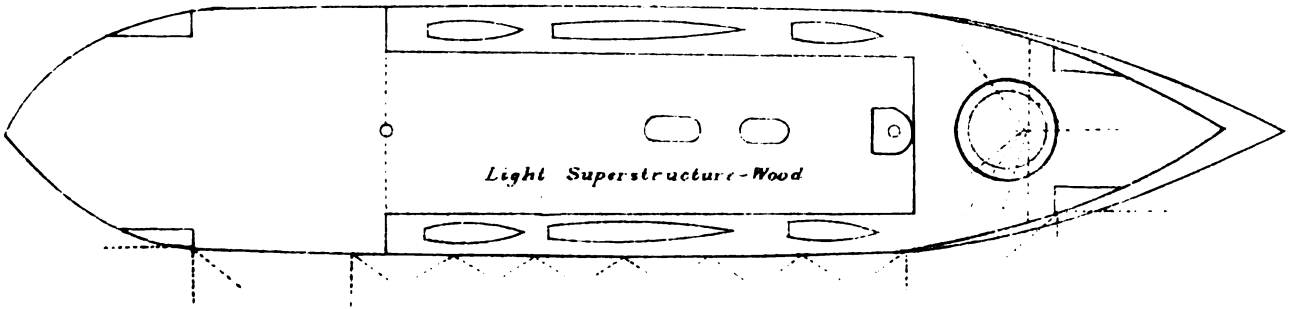
RUSSIAN SHIPS.

"Alexander II."



Belt
On Special Scale.





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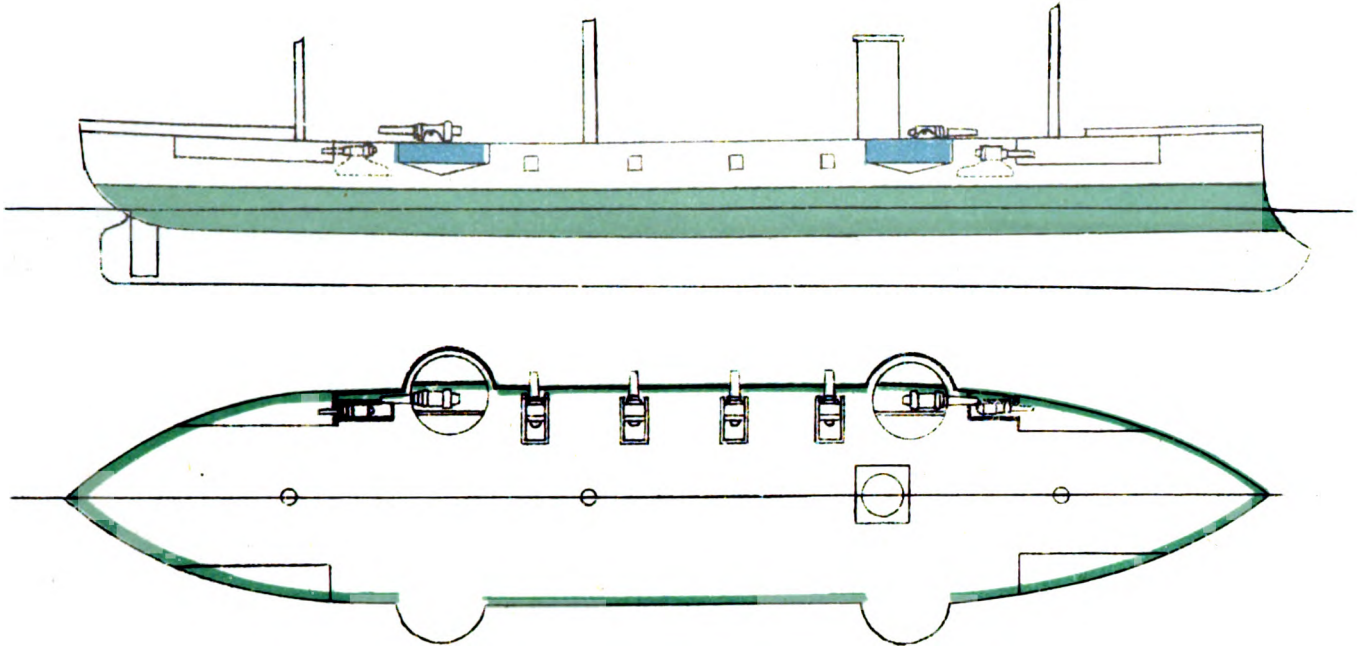
RUSSIAN SHIPS

"Minin"



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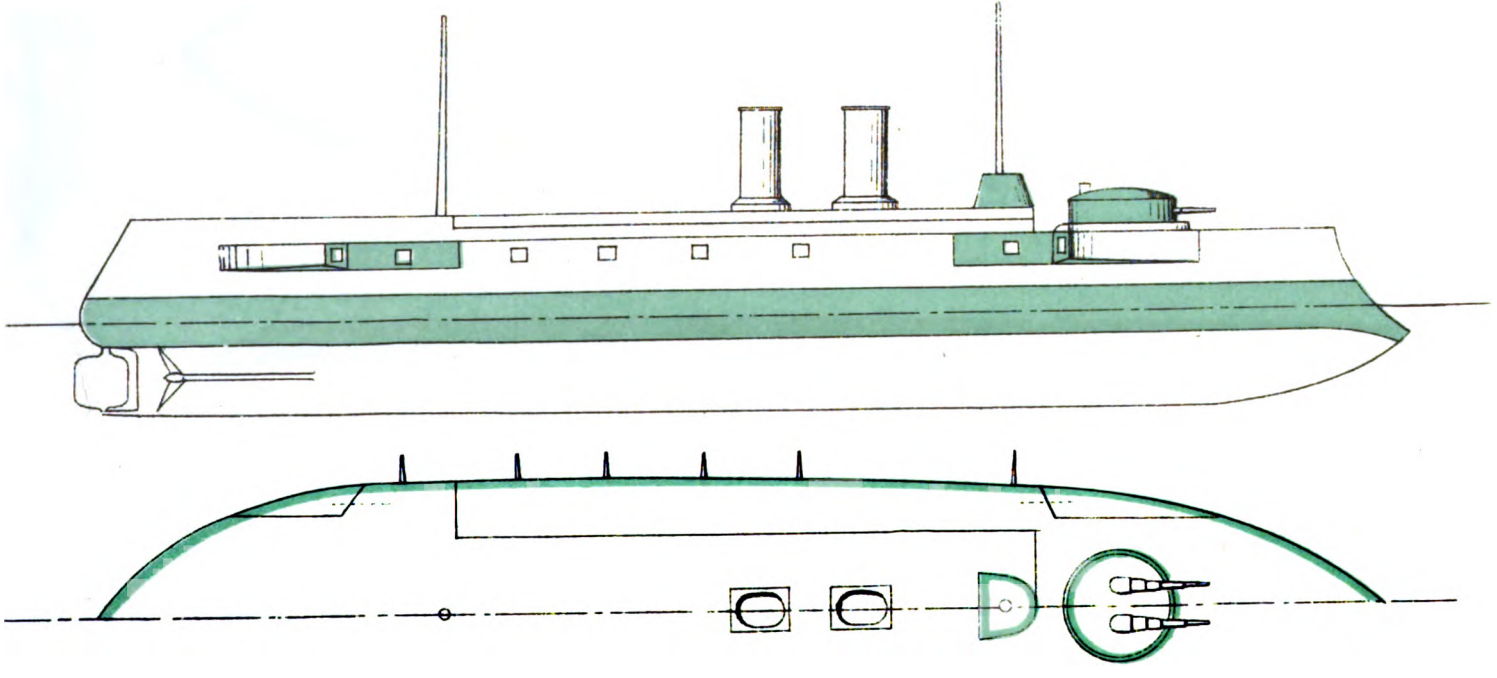
RUSSIAN SHIPS.

Nicolai I.



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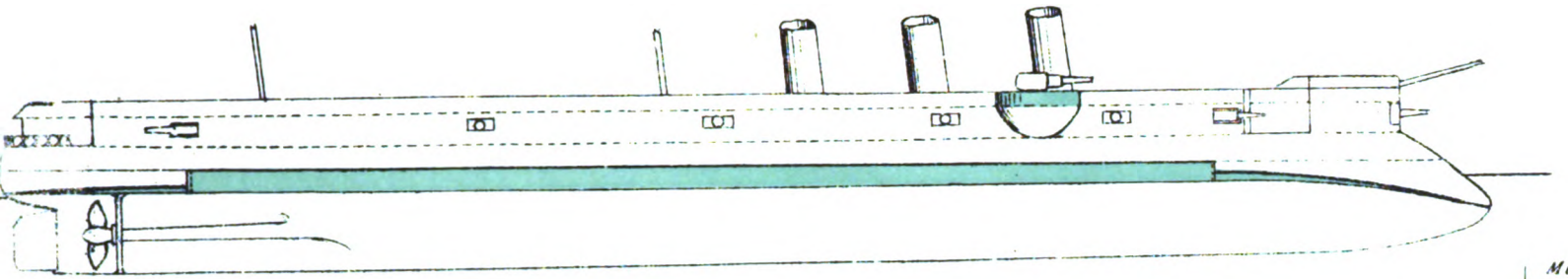
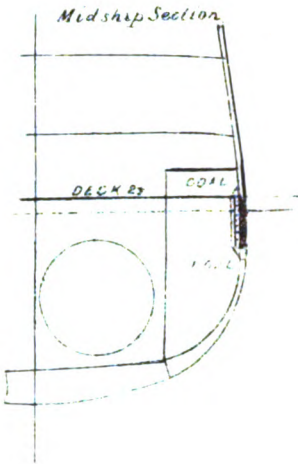
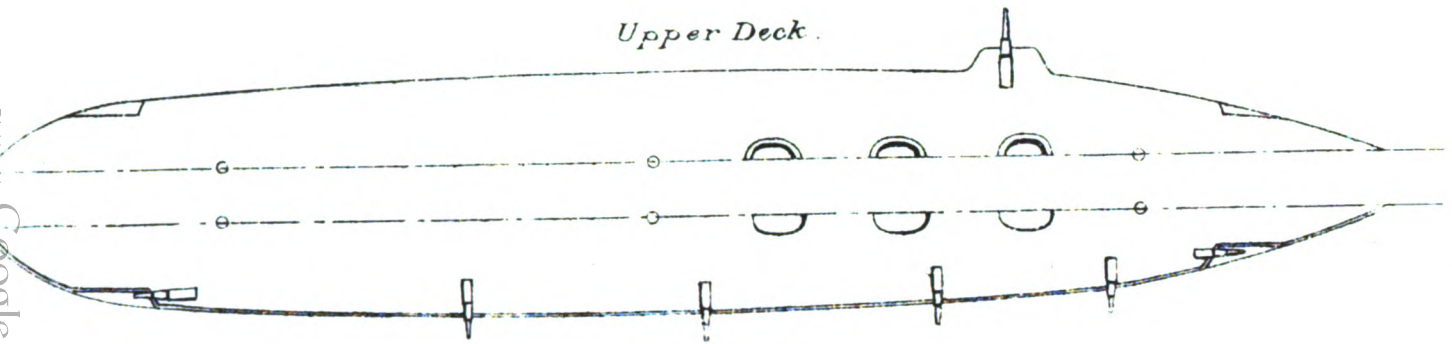
RUSSIAN SHIPS.

"Pamyat Azova".





Upper Deck.



Main Deck

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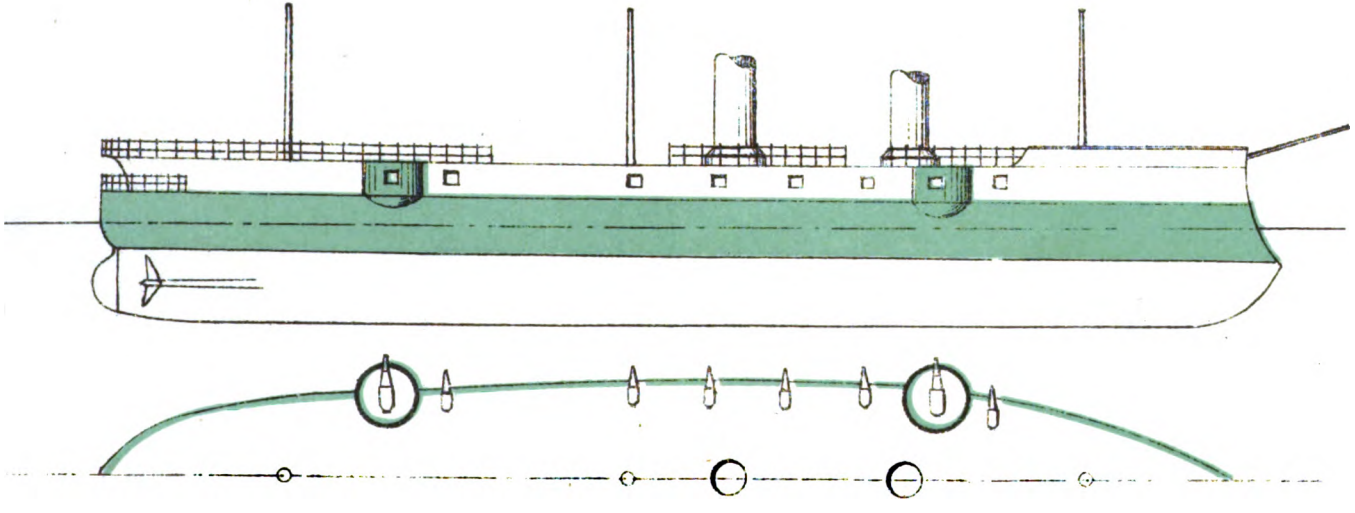
RUSSIAN SHIPS.

"Vladimir Monomach".



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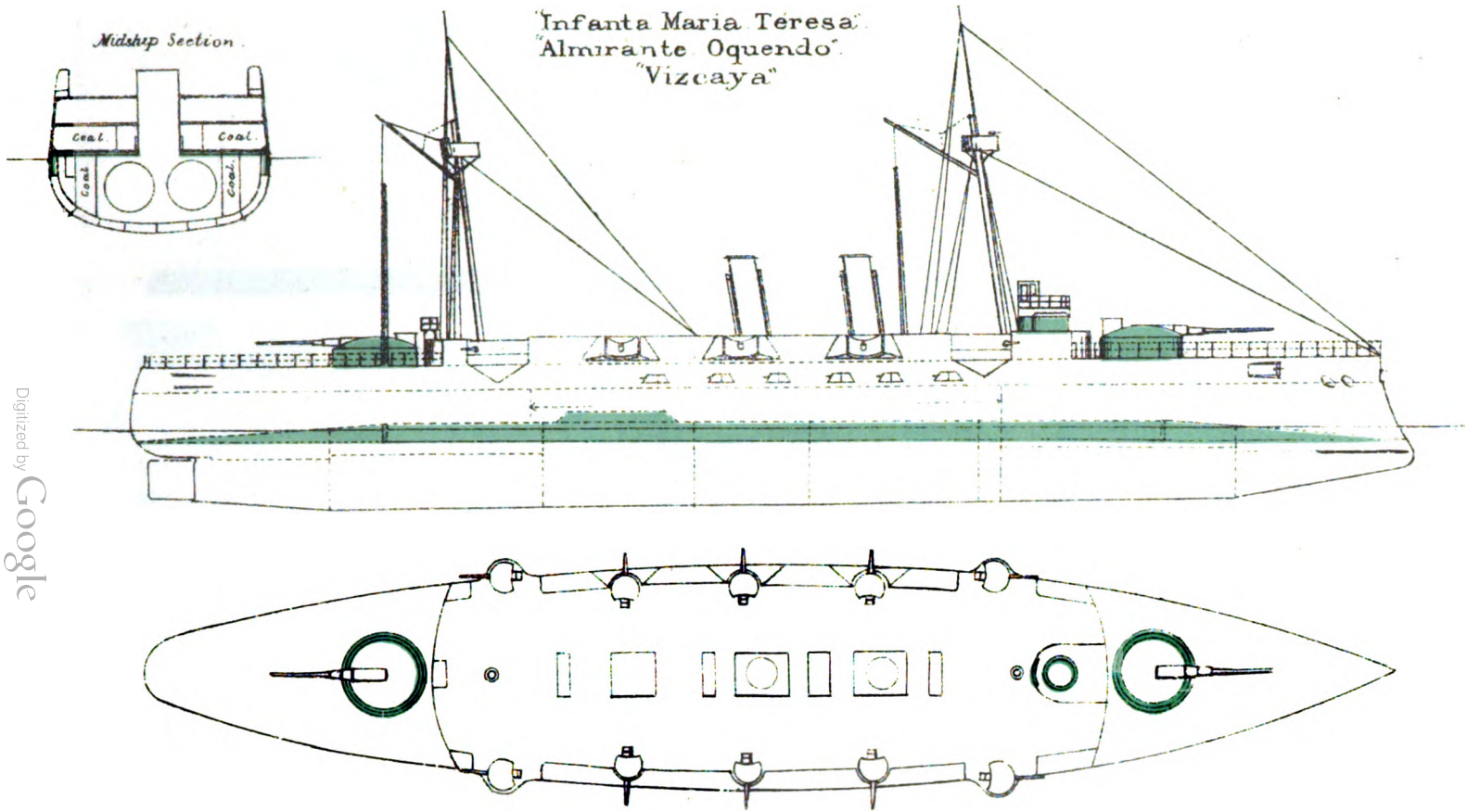
SPANISH SHIPS.



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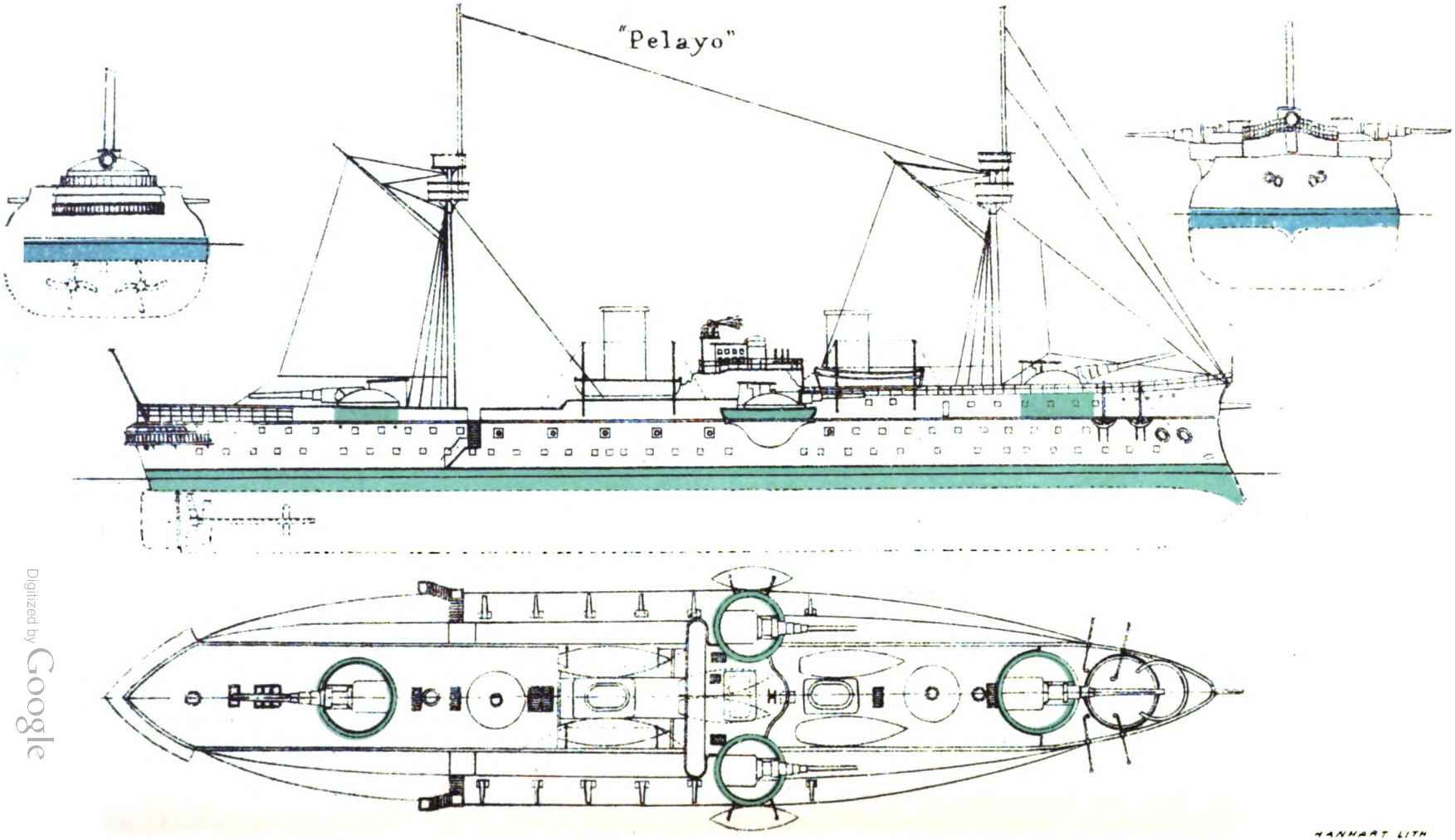
SPANISH SHIPS.

Pl. 18

"Pelayo"



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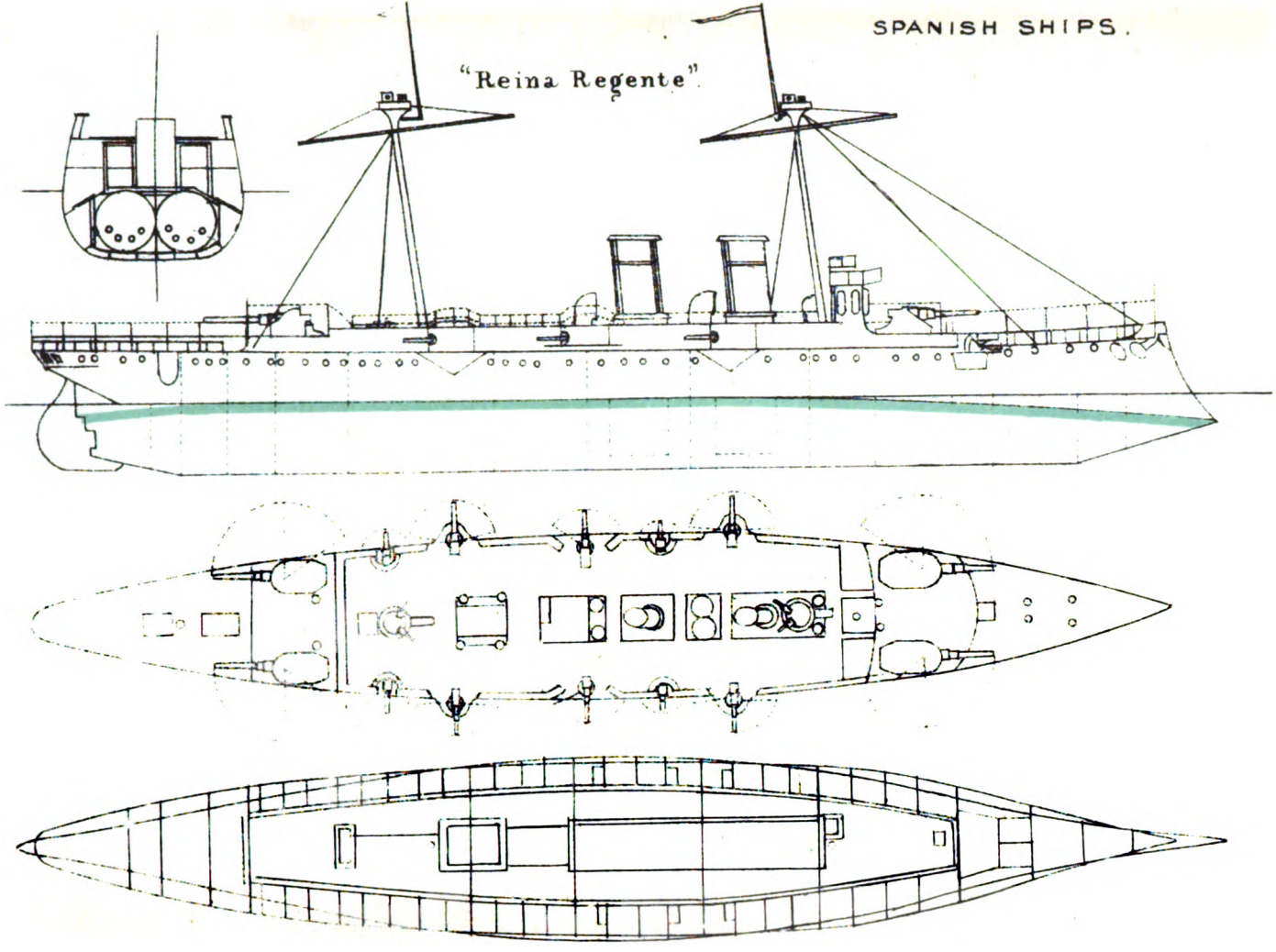

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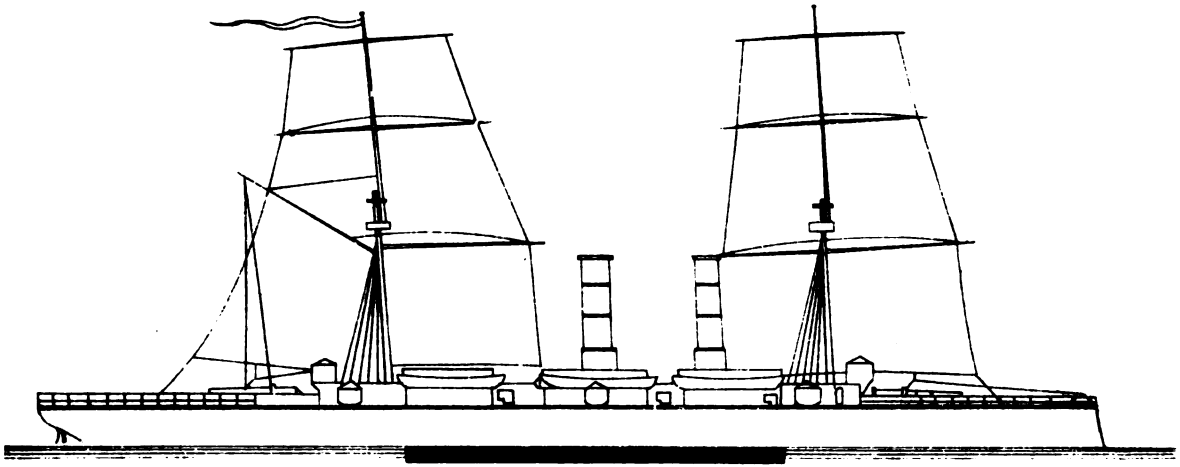
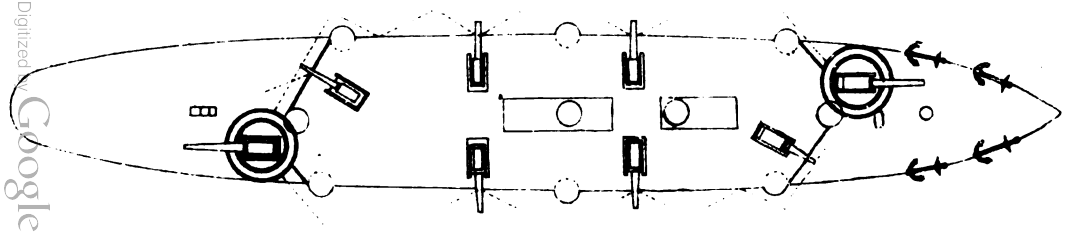
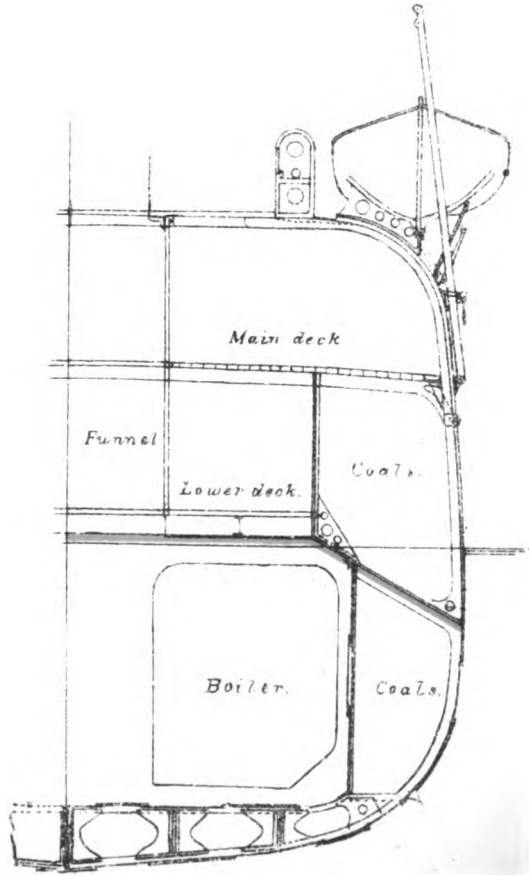
AMERICA – UNITED STATES-SHIPS.

"Atlanta" & "Boston"







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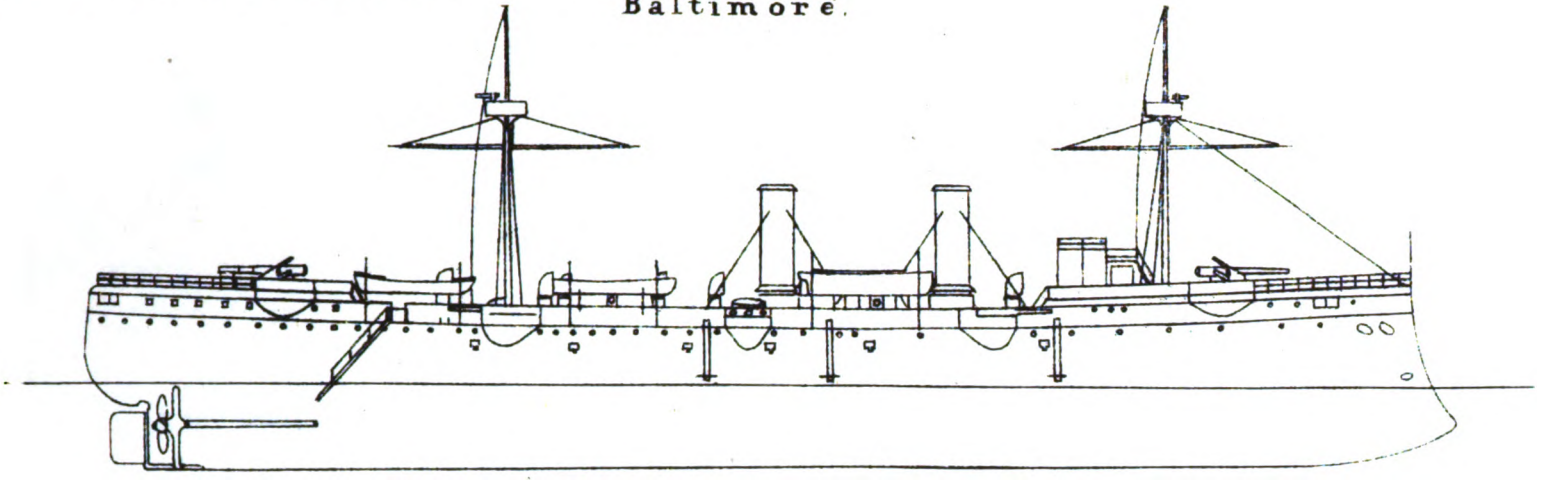
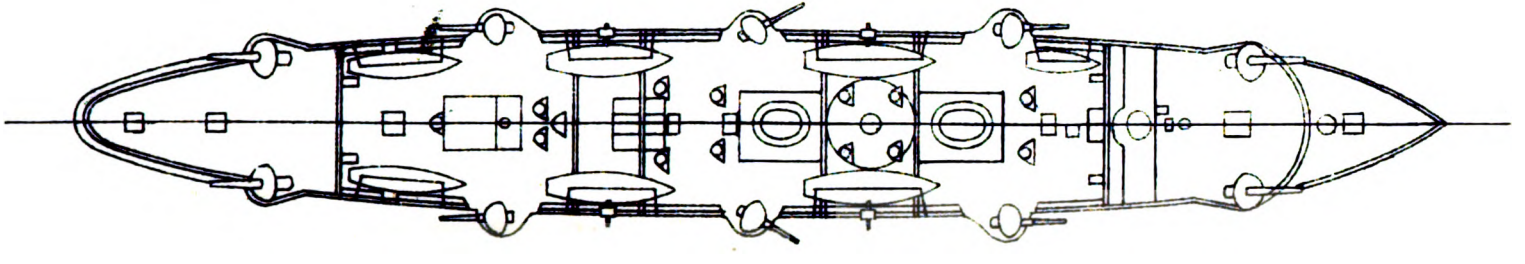
AMERICA-UNITED STATES-SHIPS.

"Baltimore".





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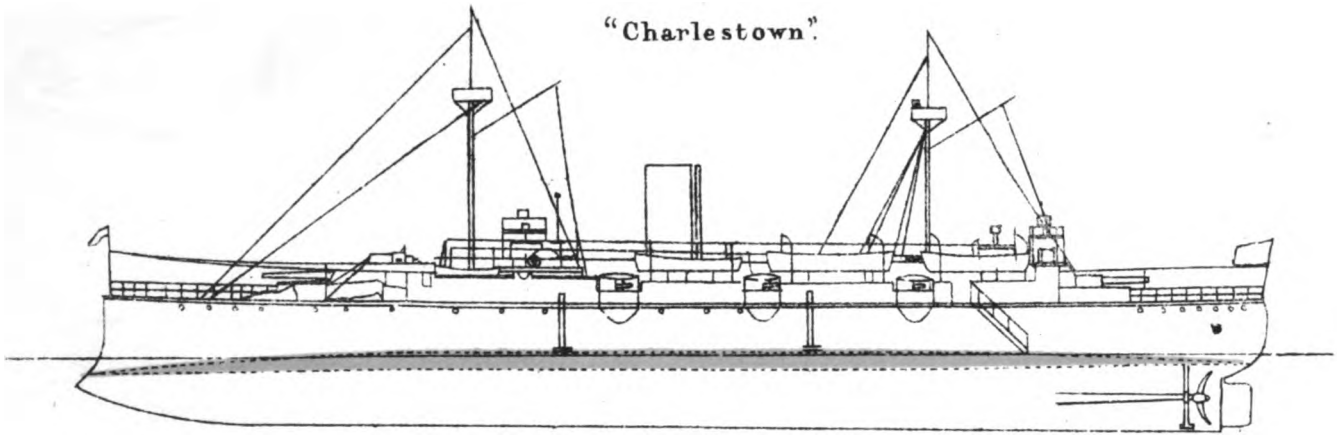
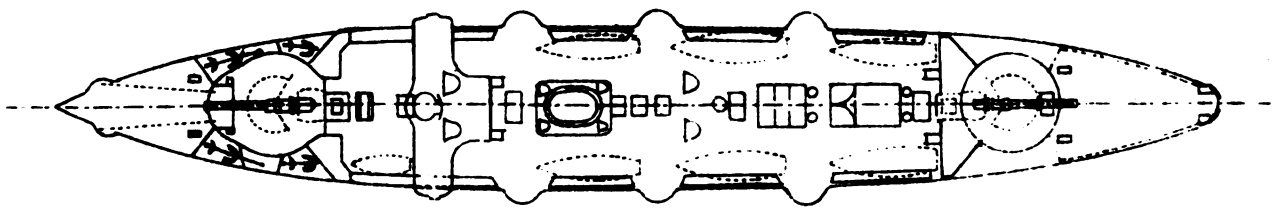
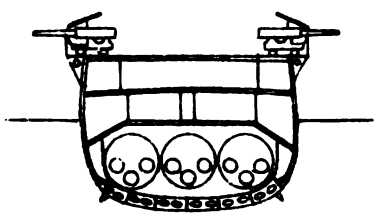
AMERICAN-UNITED STATES-SHIPS.

"Charlestown".







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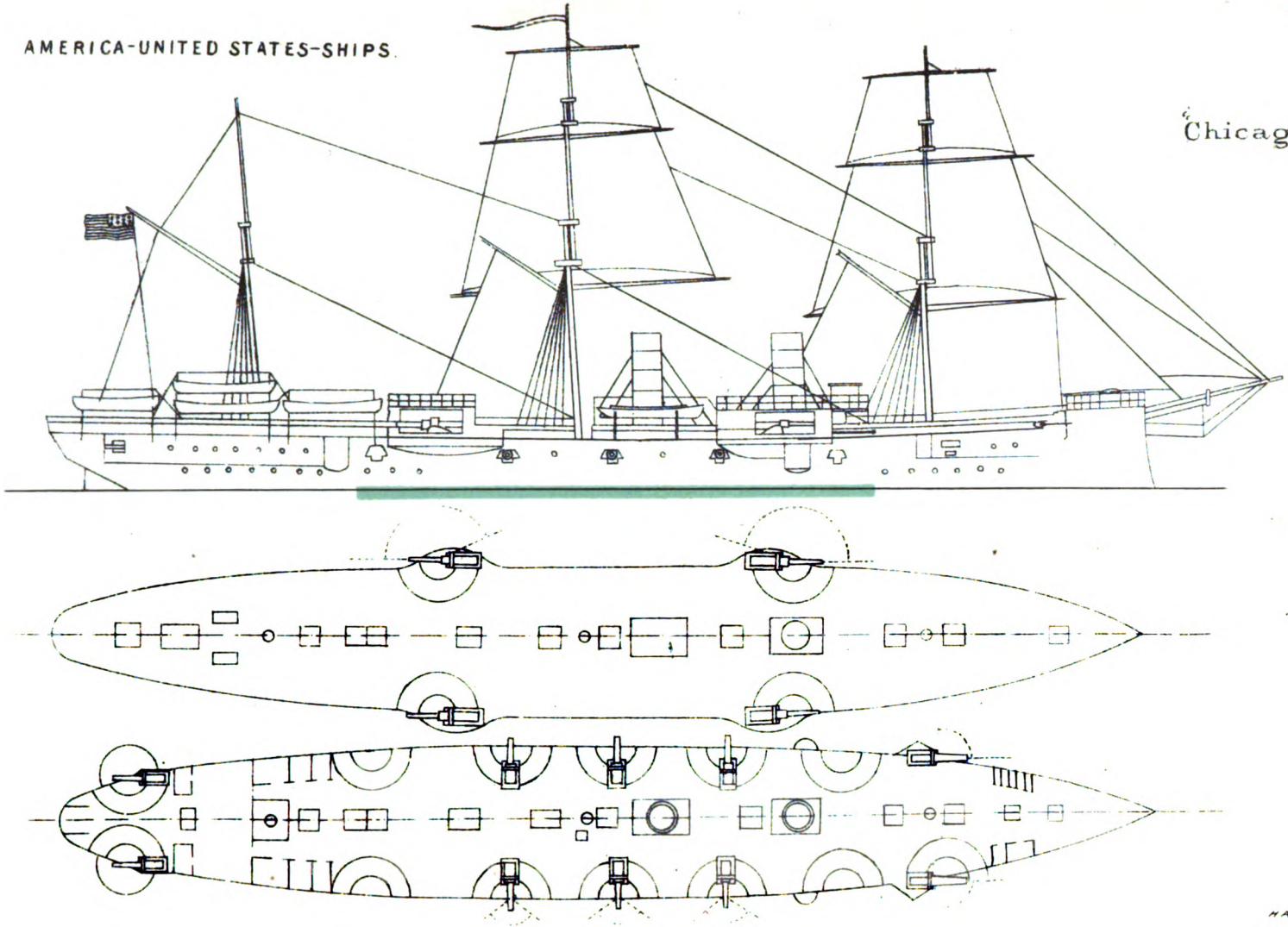
AMERICA-UNITED STATES-SHIPS.

"Chicago"



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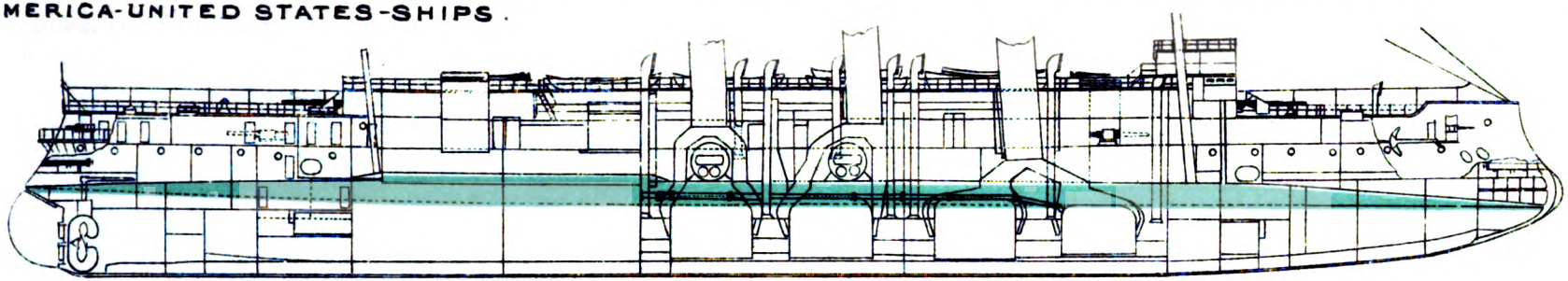
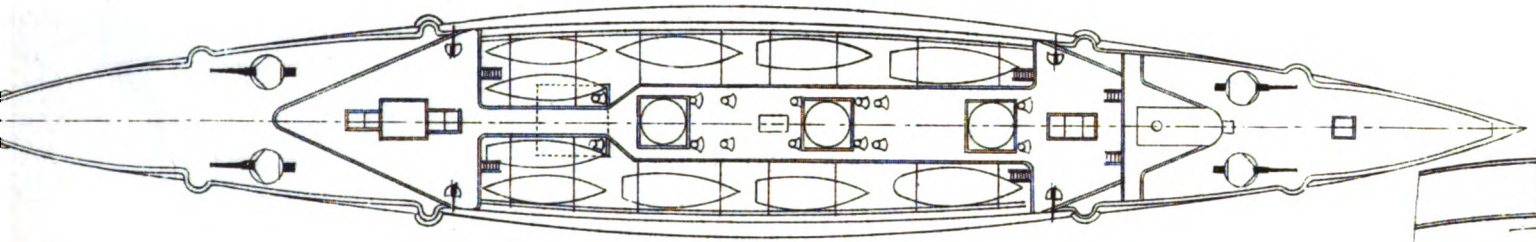
U.S. TRIPLE SCREW PROTECTED CRUISER No. 12. "COMMERCE DESTROYER".

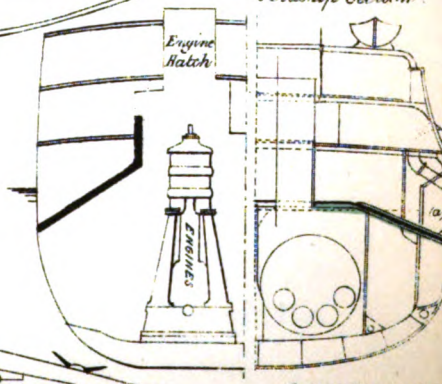
AMERICA-UNITED STATES-SHIPS.



Upper Deck

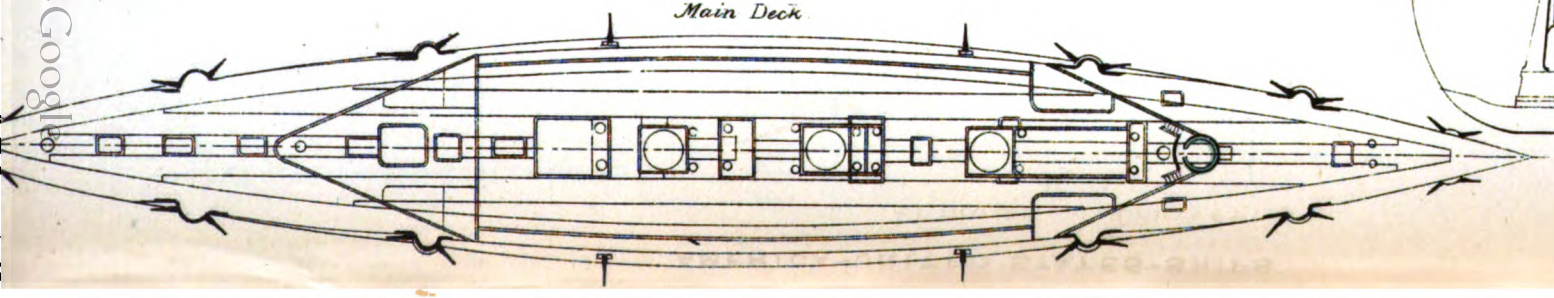


Midship Section.



(a) Water exclu
material.

Main Deck



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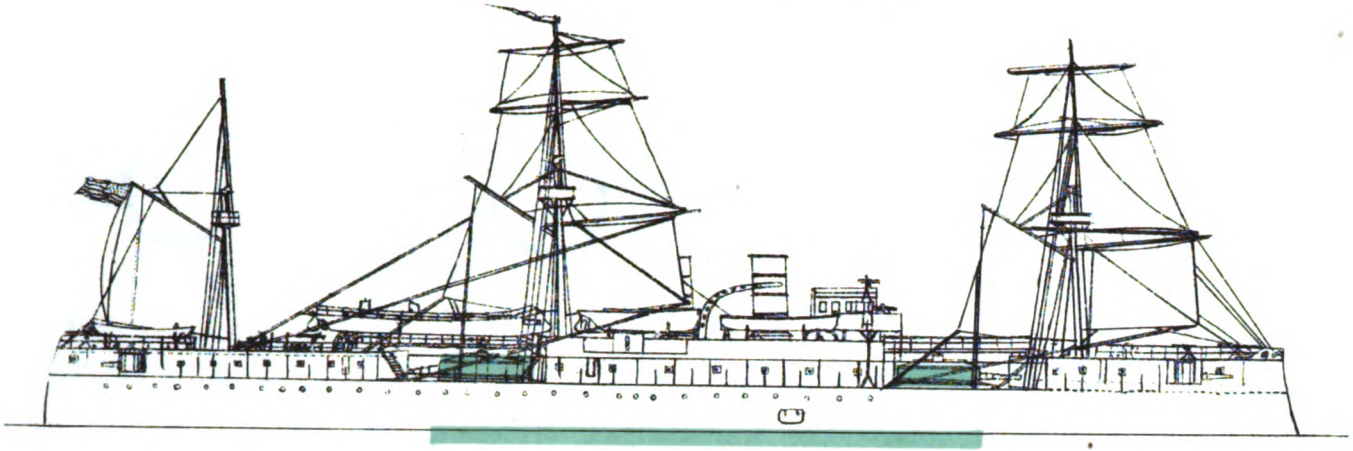
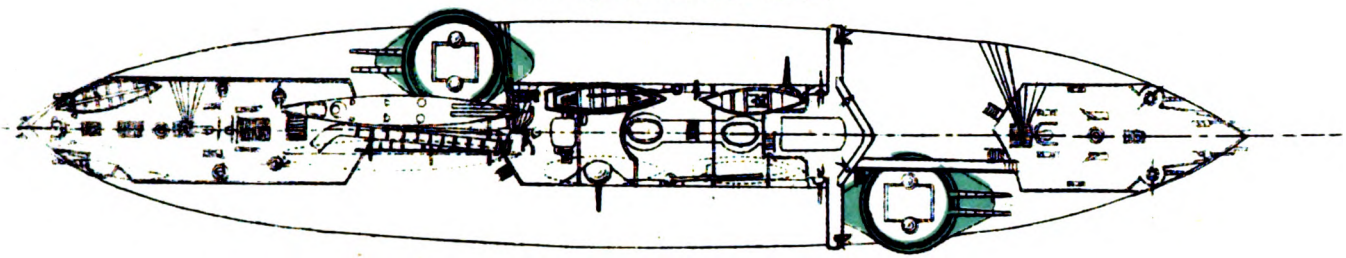
Armoured Cruiser "Maine"



Main & Superstructure Decks.



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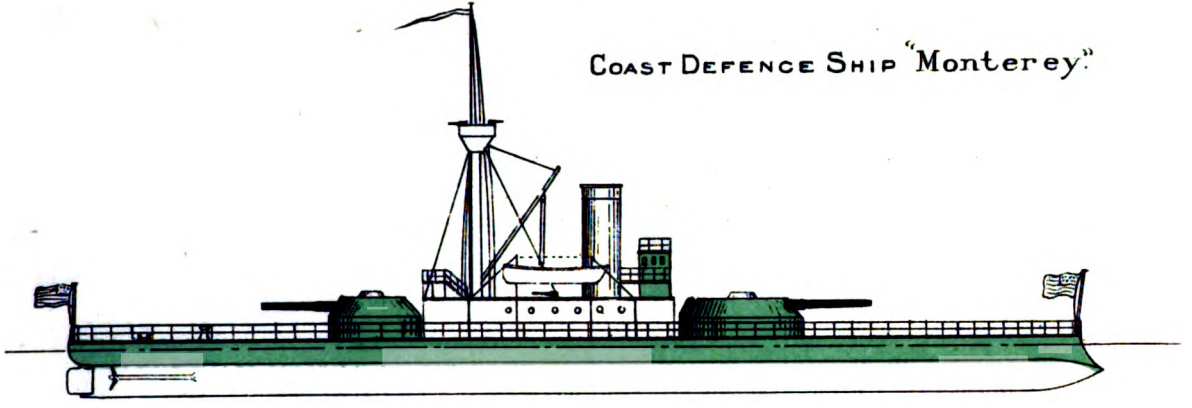
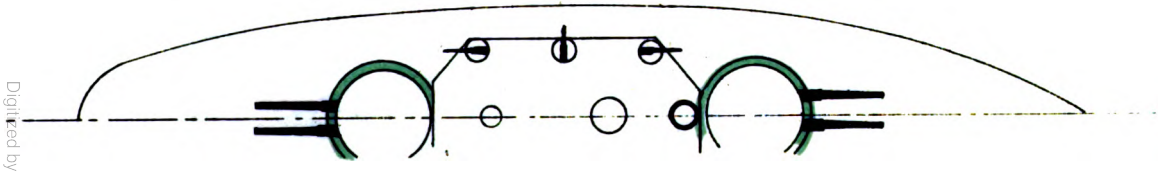
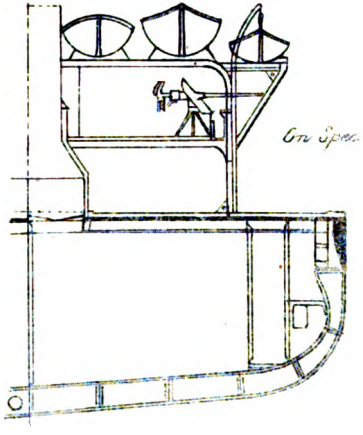
AMERICA - UNITED STATES - SHIPS.

Coast Defence Ship "Monterey."





Midship Section.



On Special Scale

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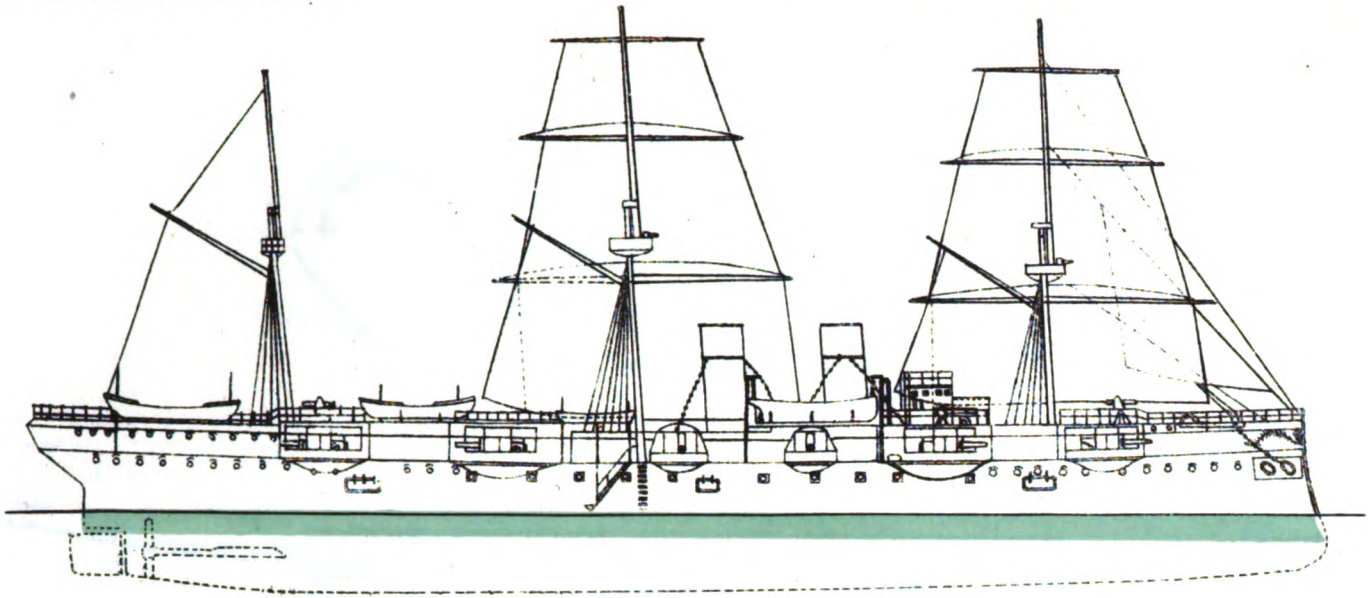
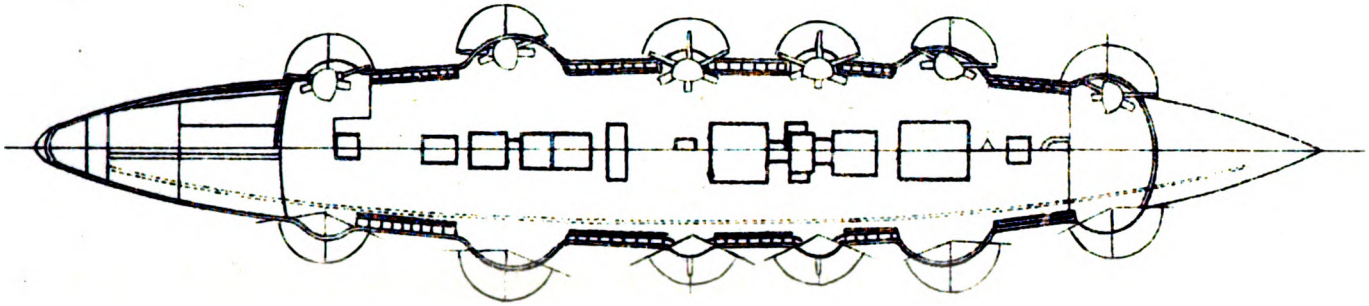
HANHART LITH.

"Newark"





HANHART LITH.

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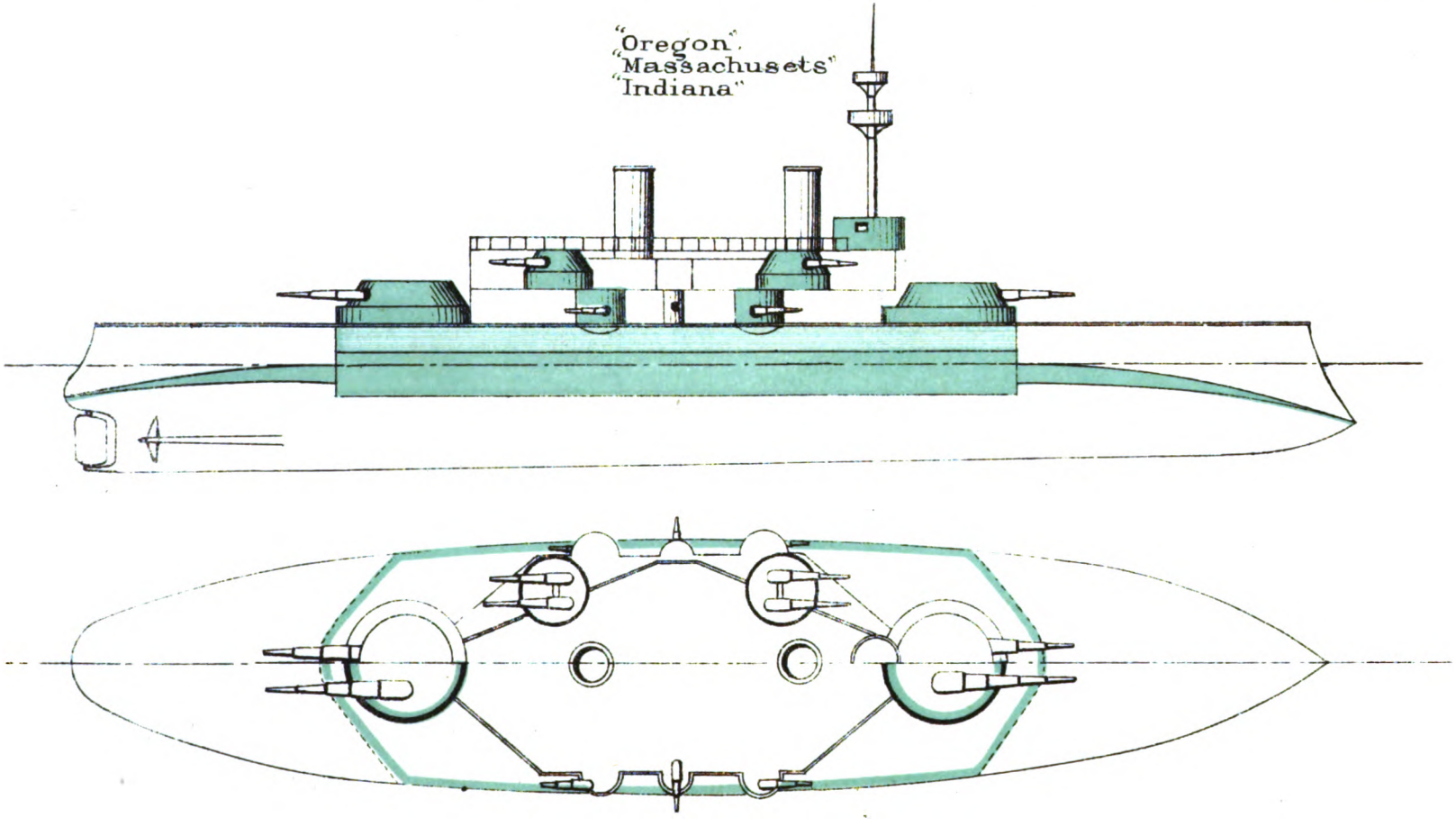
AMERICA -- UNITED STATES SHIPS - NEW BATTLE SIHPS.

Pl. 88.



MARMAR LITH.

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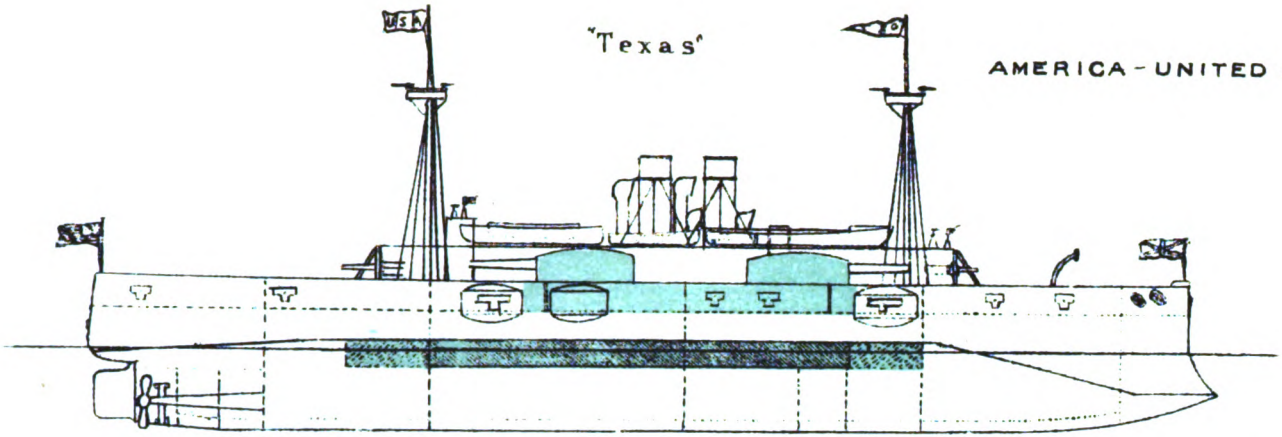
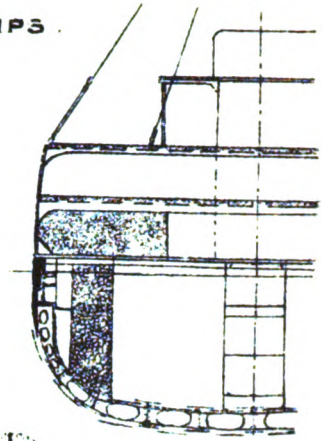
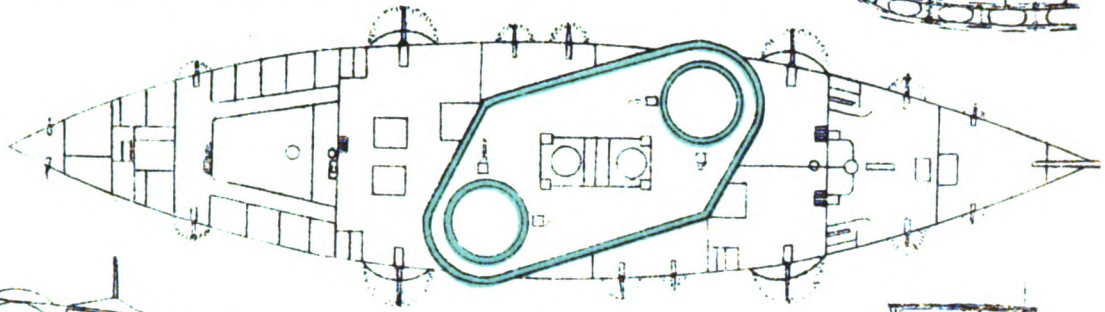
AMERICA - UNITED STATES-SHIPS.

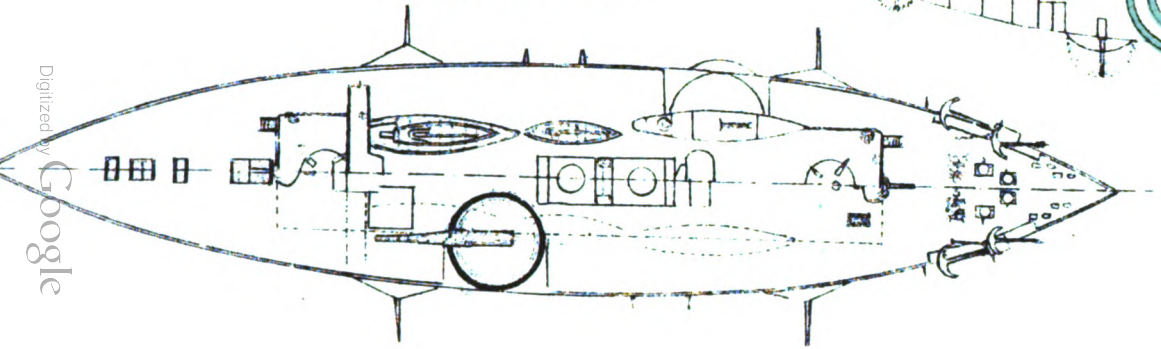
"Texas"

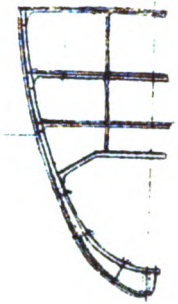






Main & Hurricane Decks.





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PART III.

ARMOUR AND ORDNANCE.

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PART III.

Armour and Ordnance.

I.

Armour and Armour Experiments.*

In May 1891 Mr. Jacques of the Bethlehem Iron Company read a paper at the Iron and Steel Institute on the development of factories for war *matériel* in the United States since 1884. The progress shown is remarkable; but the chief point calling for notice here, is the doubt expressed in the value of nickel. This is not in accord with the strong opinion in its favour embodied in the U.S. vol. of 'Information from Abroad,' published in the summer of 1891. The fact appears to be that the effect of nickel is not yet well understood. Very good results have been obtained with it in some trials at Portsmouth. On the other hand, serious disappointment was experienced in the case of a plate with a hard steel face and nickel-steel back tried at Shoeburyness on October 9th last.† The action of nickel on steel has been shown in certain cases to be remarkable; but experience is needed to enable it to be used with skill and confidence.

Jacques on U.S. *materiel* and nickel steel.

On the 19th and 20th of March, 1891, a trial of high-angle fire took place at Kwannonsaki in Japan.

Japanese trial on attack of steel decks.

The target, which was built on shore—the guns firing from the fort across a narrow bay—represented part of an armoured deck, turned broadside to the line of fire. Pl. I., figs. 1, 2 and Pl. II. show clearly the whole arrangement. The target had a depth of 18 m. (59 ft.), representing the breadth of the three 4200 tons coast-

* *List of Authorities.—Engineer*, for plates and accounts of trials; also 'Report of Chief of Bureau of Ordnance to the Secretary of the Navy, U.S.,' and other American reports; *Le Yacht*; *Engineering*; also direct communication with Bethlehem, Elswick, Cammell, Brown and Hadfield, and personal examination of plates at Shoeburyness.

† See *Engineer*, Oct. 16, 1891.

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defence vessels now building, and a breadth of 5·26 m. (17·3 ft.). It was made of three thicknesses of Creuzot deck armour-plate, each 25 mm. (0·98 in.) thick, properly riveted and jointed, and had thus a thickness all over of nearly 3 in. The plates were riveted to 9-ft. steel beams, spaced about 4 ft. apart, and the whole was properly shored and stayed.

The object of this experiment was to ascertain the effect of the howitzers and mortars, now manufactured in Japan and mounted in coast batteries there, against the decks of modern warships. The howitzer employed was a 28-cm. (11·02-in.) rifled breech-loader of cast iron, 9 calibres long, made at Osaka, from the designs of the guns made for the Italians by Sir W. G. Armstrong, Mitchell & Co.; powder charge, 9·5 kilos. (20·9 lbs.) of large grained pebble powder manufactured in Japan last year; weight of shell, 217 kilos.; bursting charge, 9 kilos.; the shell made of chilled cast iron at Osaka from Japanese ore. The distance from the target was 3450 m. (3773 yards, or 2 miles and 253 yards), requiring an angle of elevation of 58°, and angle of descent 61°. Under these conditions, and with a muzzle velocity of 218 m. (715·2 ft.), the mean error in range was 41 m. (134·5 ft.), and in direction 8 m. (26·2 ft.). The mortar employed was a 24-cm. (9·45-in.) breech-loader, rifled, of cast iron, 7 calibres long, made at Osaka, to designs from the same source as the howitzers. Powder charge, 5 kilos.; weight of shell, 122 kilos.; bursting charge, 5·825 kilos. Distance from the target, 3250 m. (3554 yards, or 2 miles and 34 yards); angle of elevation 60°, of descent 63°; supposed mean error in range 40 m. (131·2 ft.), and in direction 15 m. (49·2 ft.).

The programme for the firing made allowance for up to fifty rounds with unloaded shell and fifty with live shell for each gun, and no firing was to take place when the wind was high. Altogether the following number of rounds were fired, with hits as follows:—28-cm. howitzer, unloaded shell, number of rounds, 30; hits, two. 28-cm. howitzer, live shell, number of rounds, 15; hits, one. 24-cm. mortar, unloaded shell, number of rounds, 43; hits, three. 24-cm. mortar, live shell, number of rounds, 30; hits, one; making three hits with 45 rounds, or about 7 per cent. of hits with the 28-cm. howitzer, and four hits with 73 rounds, or about 5 per cent. with the 24-cm. mortar.

It will be seen from the drawing that if the target had been a ship's deck, instead of only a portion of it, the number of hits under the actual conditions would have been twenty-three, making a percentage of twenty on the whole number of rounds. This is about

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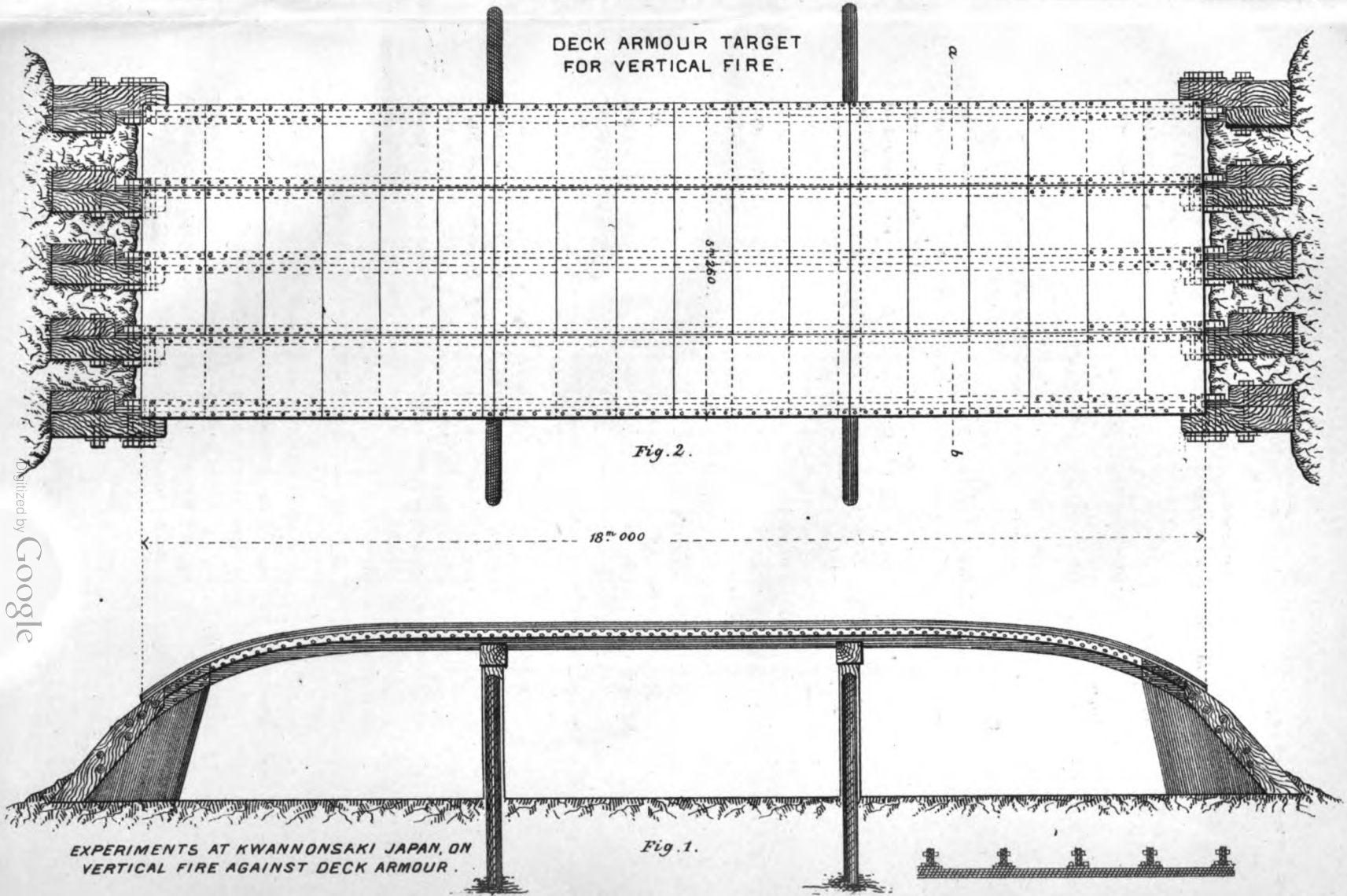

EXPERIMENTS AT KWANNONSAKI JAPAN, ON VERTICAL FIRE AGAINST DECK ARMOUR.

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DECK ARMOUR TARGET FOR VERTICAL FIRE.

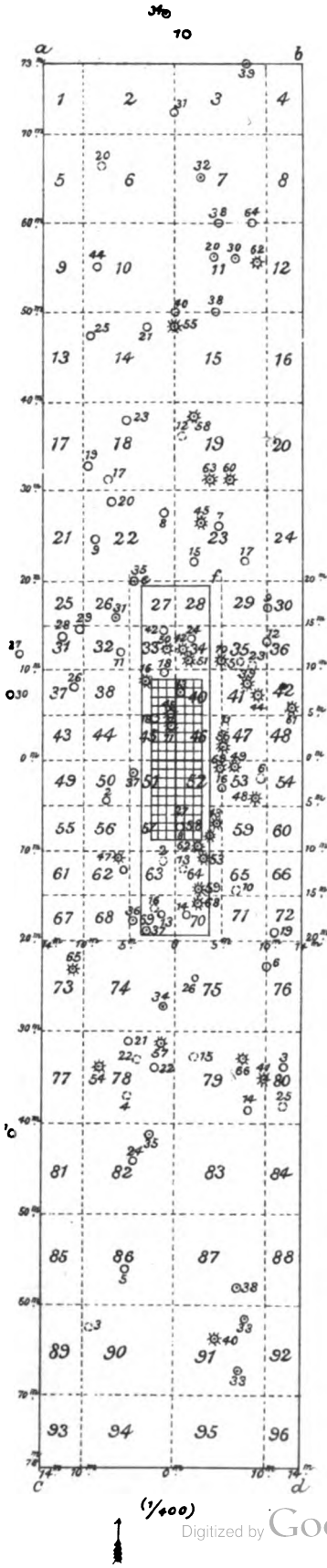

Fig. 3.

EXPERIMENTS AT KWANNONSAKI JAPAN, ON VERTICAL FIRE AGAINST DECK ARMOUR.

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the same result as at the Bucharest trials some years ago, where the percentage under the same conditions was twenty-two.

As regards penetration, every shell went clean through the target, and buried itself about 2 m. (6·6 ft.) in the ground. With the unloaded shell, with the howitzer as well as with the mortar, the two lowest layers were almost punched through, and no cracks were visible. The upper layer was generally bent a little down in the hole, and showed a concentric crack at some 3 in. from the periphery of the hole. Where the shell hit on the top of a beam a larger piece of this was torn off. Altogether, the target proved far too weak for the artillery opposed. This was even the case under the most favourable conditions, as at round forty-three, where the deck curves away from the trajectory; the only difference here being that the material of the upper plate on the off-side was pressed upwards instead of downwards.

The Japanese artillery officers had great expectations as to their fuse, which is a percussion fuse with retarding effect, and they expected that the bursting of the live shell would produce an enormous effect on the target. This was, however, not fulfilled, as the two live shells only exploded after being buried in the soil. The holes made by these shells did not therefore present a very different appearance from the other hits, although some of the material round the hole was bent upward through the pressure of the explosion below. The deck plates employed in the target seemed on the whole to be of a fair quality, not disposed to crack; whereas the beams seemed to be very inferior, and would have caused great destruction of life on the deck below. It is desirable always to use good quality steel beams for protective decks. The chilled shells made from Japanese iron behaved admirably.

The important features in this trial are the employment of a curved steel deck, instead of mere flat plates, and the use of chilled iron projectiles, which are much more likely to be available for vertical fire than those of costly forged steel. Three inches of steel is a stronger deck than would generally be found in vessels attacking our coaling stations for some time to come. It would be a serious thing for a ship to anchor within two miles of a battery which would strike her deck with one shell out of five, and apparently perforate it with a shell which would burst beneath it, unless prematurely broken by striking gear or structure above the deck.

Spezzia turrets.

The Italian Grüson turrets for the defence of Spezzia Harbour have been for some time past completed, and trials were made with their Krupp 119-ton guns mounted on Elswick carriages with accumulators

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and working gear. The cupola, weighing 2050 tons, turned a complete revolution in 1 min. 20 secs., using two out of four turning engines, and 1 min. 45 secs. using only a single engine. Thirty-one rounds were fired from the guns. These turrets are far the most powerful erections of their class.

111-ton gun fired at armour.

In the Naval Exhibition was given, with the model of the Elswick 111-ton gun, the record of a round fired from one of the pieces now on board H.M.S. Sans Pareil on March 14, 1891, against a target made up as follows. A compound plate 20 in. thick was backed by 8 in. of iron enclosed in a heavy wrought-iron frame; behind this was 20 ft. of oak, then 5 ft. of granite, 11 ft. of concrete, and lastly 6 ft. of brickwork. The projectile struck the centre with a velocity of 2079 ft. per second. It passed through both plates, timber granite, and concrete, nearly getting through the brickwork, forcing out a wedge-shaped portion of it. The 20-in. compound plate was shattered into many pieces.

American armour plates.

Annapolis trial.

The manufacture of all steel armour undertaken by the Bethlehem Iron and Steel Works was sufficiently pushed on to enable a plate 6 ft. × 6 ft. × 11½ in. to be submitted for trial at Annapolis in January 1891. The test was not very severe. Three rounds were fired with Holtzer steel projectiles of the usual kind weighing 100 lbs. The striking velocity in the two last rounds was 2065 ft. per second, and the calculated perforation 13·1 in. of iron, or 10·5 in. of steel. The plate stood well.

Indian Head trials.

Some important trials took place at Indian Head in November 1891. The plates tested were all of the same dimensions, viz., 8 ft. × 6 ft. × 10½ in. Three were first tried, viz., No. 1, a high carbon nickel-steel made at Bethlehem, No. 2, a low carbon nickel-steel made by Carnegie, Phipps & Co., and No. 3, a Bethlehem low carbon-steel, Harveyed, that is to say, with the face carburized and hardened on Harvey's system. At these four rounds were fired, about the centre of each quarter of each plate, with 6-in. Holtzer projectiles, with a striking velocity of 2075 ft. and a perforation of 13·2 in. of iron, or 10·6 of steel, and one delivered in the centre of the plate with an 8-in. Firth-Firminy steel projectile. Of these the high carbon nickel Bethlehem plate stood the best. Two 6-in. projectiles were broken on it, and two rebounded. The greatest penetration was 13 in. (*i.e.* the point passing 2½ in. beyond the original back of the plate).

A second trial took place on November 14, 1891. The plates were of the same dimensions as those mentioned above, and were as follows: No. 1, high carbon nickel-steel, made by Carnegie & Phipps; No. 2, low carbon nickel-steel, Harveyed, Carnegie & Phipps; No. 3,

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INDIAN HEAD TRIALS. U.S. BETHLEHEM PLATE.

Fig. 4. FRONT.

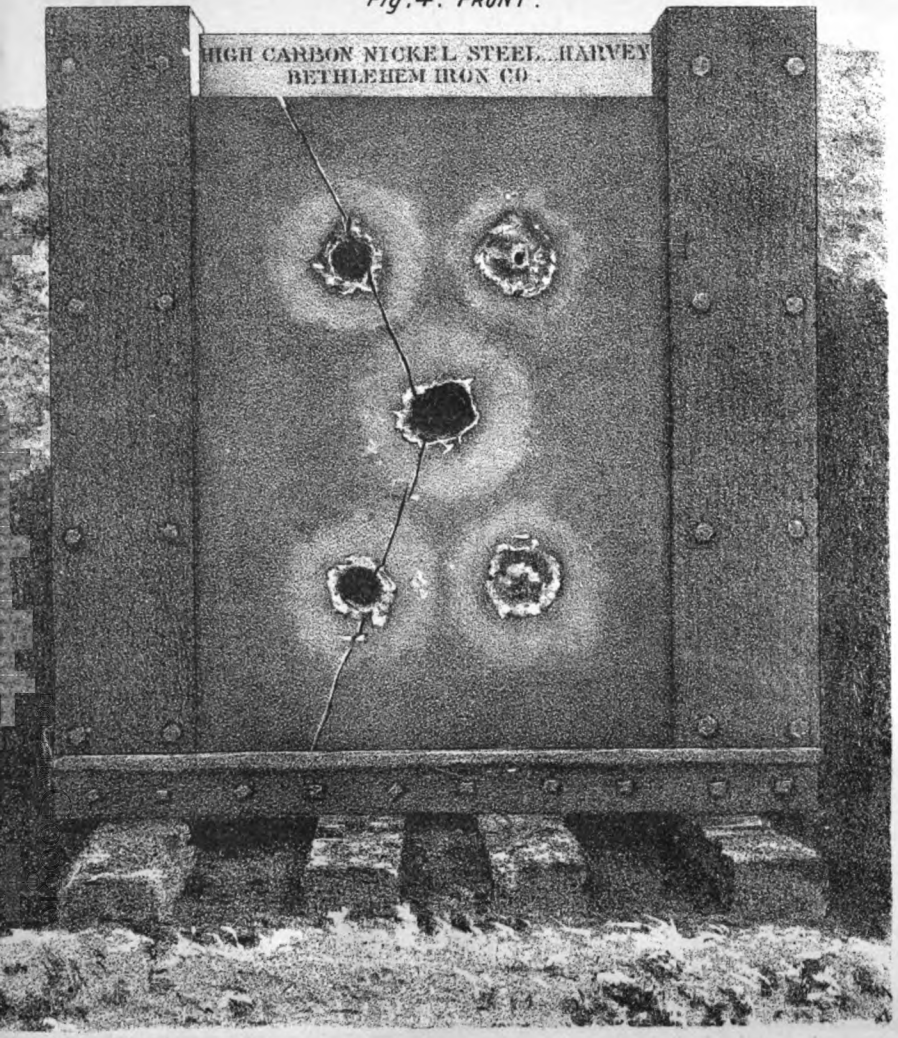
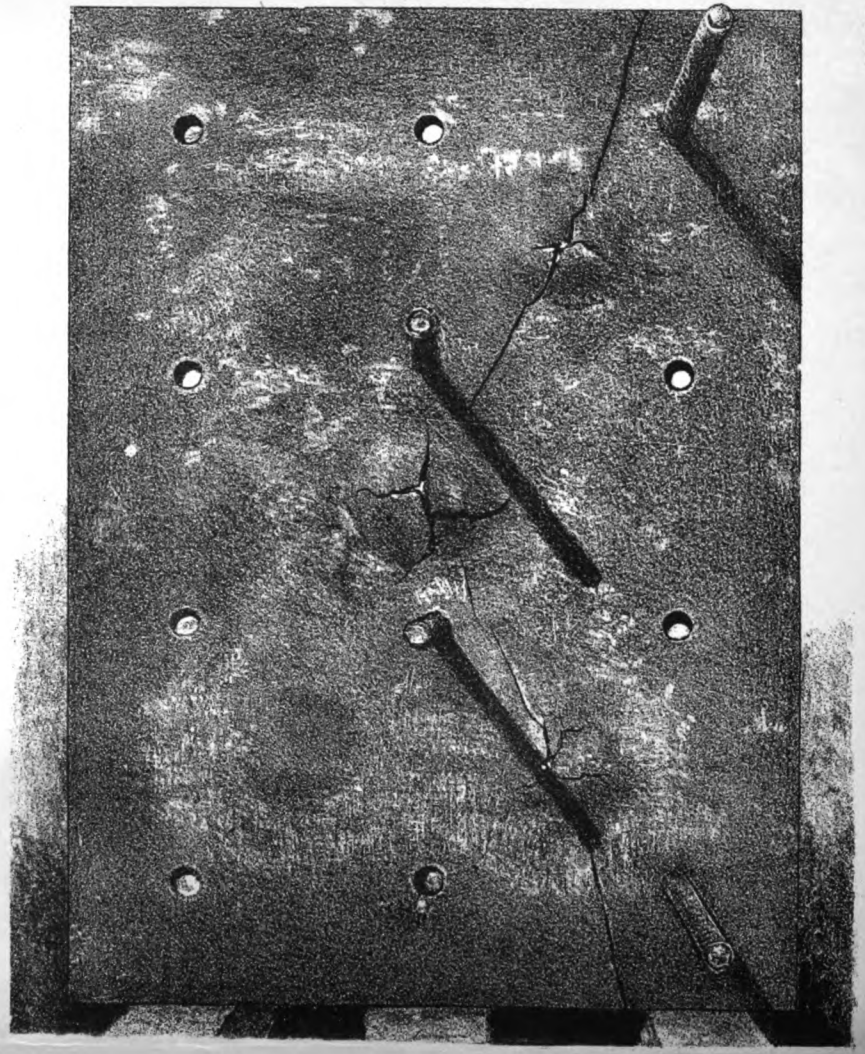


Fig. 5. BACK.



high medium carbon nickel-steel, Harveyed, from Bethlehem. The projectiles and velocities were the same as before, except that a Carpenter 8-in. steel projectile was fired against the Carnegie & Phipps plates instead of one of Firth-Firminy. On this occasion the best plate was No. 3, shown in Pl. III., figs. 4 and 5,* the Bethlehem Harveyed nickel-steel plate, against which three out of four Holtzer projectiles broke up, one rebounding uninjured. The plate was an admirable one, beating any plate hitherto tested, except the compound plates which have been made by Brown, and hardened by Tresidder's process. With these, as noticed hereafter, no exact comparison can be made, owing to the difference of the tests. The left side of the plate appeared to be softer than the right, one projectile penetrating to a depth of 13 in. (*i.e.* point 2½ in. beyond the original back of the plate), and the other penetrating 12¼ in. and rebounding unbroken; whereas the penetrations on the right side were only 5 in., the projectiles being, no doubt, shattered by the hard face before they could deliver their full blow. The effect of the fifth round was instructive, for the 8-in. projectile rebounded, slightly set up after breaking the plate in a line running through the shot holes on the left side—not through the right portion, where the fracture might be expected to be greater, if all the work had been fairly delivered on it, seeing that the plate was harder and the penetration less than on the left.

The Board of Officers appointed to conduct these experiments unanimously placed the plates tested in the following order of merit † :—

(1.) The high carbon nickel-steel Harvey-Bethlehem plate.

(2.) The high carbon nickel-steel Bethlehem plate (un-Harveyed).

(3.) The high carbon nickel-steel plate of Carnegie, Phipps & Co.

(4.) The low carbon nickel-steel Harvey plate of Carnegie, Phipps & Co.

(5.) The low carbon nickel-steel plate of Carnegie, Phipps & Co.

(6.) The low carbon-steel Harvey-Bethlehem plate.

French steel plate trials.

In July 1891 ‡ two nickel-steel plates of Schneider's were tested. They were 265 mm. (10·43 in.) and 250 mm. (9·84 in.). The thicker plate was attacked by a 16-cm. (6·3-in.) gun firing chrome-steel projectiles weighing 45 kg. (99·2 lbs.), with a striking velocity of 658 mètres (2159 ft.), implying a theoretical perforation

* Official photograph sent by the courtesy of the Chief of the Bureau of Ordnance.
† See 'Report of Chief of Bureau of Ordnance for 1891.'
‡ *Le Yacht*, Oct. 24, and *Engineer*, Nov. 26, 1891.

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of 13·35 in. of iron, or 10·68 in. of steel. Out of five projectiles two perforated entirely; one broke with a penetration of 309 mm. (12·09 in.) from the front face; one rebounded after penetrating 283 mm. (11·14 in.), and one lodged with a penetration of 428 mm. (16·85 in.). The plate exhibited the toughness which has been characteristic of other nickel plates of Schneider's; indeed, it seems to have closely resembled in behaviour the Schneider nickel Annapolis plate fired at in the autumn of 1890. It was rather overmatched, and behaved very well, but its action cannot be compared with that of the plates with faces hardened on Harvey and Tresidder's systems.

The second plate (9·84 in. thick) was attacked by an old-type gun, 24-cm. (9·4-in.) calibre, with three chilled iron projectiles. The projectiles were broken and the plate split. The striking velocity was 1343 ft., and weight of shot 144 kg. (317·5 lbs.); the perforation should be 11·76 in. iron, or 9·41 steel. The shock per ton of plate was 329·8 ft.-tons. Seeing that chilled shot were employed the result does not appear to be particularly good, although it was highly reported on after a second trial of some unbroken portions with steel projectiles.

Compound Brown-Tresidder plates.

A series of trials of compound plates made at Brown's Works, Sheffield, with faces hardened by a process devised by Captain Tresidder, took place at Shoeburyness during the summer and autumn of 1891.* To learn the precise effect of the process, portions cut from the same plate were treated, some on Tresidder's process, and others oil-hardened, and subjected to the same firing-test. Repeated trials showed that the blow which perforated the ordinary oil-hardened plate was borne by the Tresidder plate, owing to the fact that the projectile broke up against it in a manner closely resembling the behaviour of a chilled iron shot. So much was this the case, that in some instances the white splash characteristic of the impact of chilled metal which has been pulverised was seen on the plate face; and the impact has been pronounced to be that of a chilled projectile by an experienced officer who inspected the plate without knowing the conditions of the trial. Through a series of five comparative trials the same result was obtained, the projectile never failing to break up without effecting perforation, except in two instances, when the firing was continued until blows were delivered in such a way that the plate had not a fair opportunity of opposing the projectile. The projectiles employed were Hadfield's forged steel, which

* A more full account, with copies of the official photographs of the plates, appeared in the *Engineer* of Nov. 6, 1891.

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ARMOUR-PLATE TRIALS AT PORTSMOUTH.

Browns Compound Plates (Tresidder's special treatment) after five rounds.

Fig. 6.

Fig. 7.

Fig. 8.

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are now almost identical with those of Holtzer, though they would probably not be recognised as up to the same established standard. The weight of each shot was 100 lbs. The striking velocity varied according to the thickness of the plate. For a small 9-in. plate, it was 1824 ft., giving a calculated perforation of 11·5 in. of iron, or 9·2 in. of steel, and nearly 900 ft.-tons energy per ton of plate. For a second 9-in. plate the elements were, striking velocity, 1868 ft.; perforation 11·9 of iron, or 9·5 in. of steel, and 942 ft.-tons energy per ton of plate. A 10½-in. plate was attacked by a projectile with 1967 ft. velocity, and a perforation of 12·5 in. of iron, or 10·0 of steel. Another larger 10½-in. plate was subjected to repeated blows much on the system of the Portsmouth test. This was, however, not a complete plate or experiment.

Portsmouth trial.

We pass on to a trial which took place on board the Nettle, Oct. 2nd, when the regular conditions were carried out. The projectiles here employed were three standard Holtzer 6-in. steel shells, weighing 100 lbs. each, and two Palliser chilled iron projectiles. The velocity was about 1976 ft. per second, the charge being 48 lbs. E. X. E. powder. The energy was 2708 ft.-tons, and the theoretical perforation 12·57 in. of iron, or 10·1 in. of steel. The plate was as usual 8 ft. × 6 ft. × 10½ in. Figs. 6 and 7, Pl. IV., show the front and back of the plate after the trial, and Fig. 8 the edge. Rounds No. I. and IV., steel and chilled iron respectively, produced less effect than II. and III., also steel and chilled iron respectively, the lower half of the plate being apparently harder than the upper. Round I. would, we think, be mistaken for a chilled projectile. II. and V. are badly broken up, and have the same appearance in a less degree. The effects at the back, shown in Fig. 7, bear out the conclusions which would be naturally drawn from the front view. How little a supporting structure would suffer may be seen by Fig. 8, which shows the plate slightly warped or curved by the process. This raises an important question as to the application of armour hardened on any system. It is stated that the plate can be made flat or curved in any desired way on Tresidder's process; but this must be proved. A comparison is naturally made between Tresidder's plate and the Bethlehem high carbon Harveyed nickel plate, which produced the admirable result given on p. 295. It is impossible, however, to compare these plates completely and fairly, because the Indian Head trial was much more severe than at Portsmouth. The velocity was greater, all the projectiles fired were of forged steel, and the final 8-in. round may be regarded as a test pushed to destruction. Captain Tresidder might

Comparison of English and American plates.

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no doubt fairly plead that every projectile had broken up on his plate, whereas one 6-in. had rebounded unbroken from the Bethlehem plate. As there were four steel, however, in the latter case, and only three in the former, the comparison is not complete, and the plate which was actually submitted to the most severe blows has a sort of advantage from having been more completely tested. In a short time, no doubt, further data for comparison will be available.

Messrs. Cammell have submitted a solid-steel plate for trial at Portsmouth, when results were obtained with which they were highly satisfied. The makers consider, however, that there is no evidence that solid steel is superior to compound. Trials have again been made both by Cammell and Brown of compound plates with steel in the back, but up to the present time nothing has been definitely approved in this way. Nickel-steel deck plates have been made with great success by Messrs. Cammell, and actually approved and supplied by them for nearly all the vessels of the Ramillies class.

Nickel-steel deck plates.

Nickel-steel plates have been made at St. Chamond and tested on a small scale, and manifested toughness; but a plate 1·58 in. thick, attacked by a 4·72-in. gun with very low velocities, is under such exceptional conditions that little can be learned from a few trials.

Improved resistance of new armour.

Altogether, it may be said that both in England and America armour plates have been made and tried during the past year which have exhibited resisting powers greatly in excess of those hitherto tested. This success has been mainly due to increased hardness in the face which caused the forged-steel projectiles to break up. It cannot, however, be said that this increased resisting power is secured for ships until it is proved that such excellence is habitually obtained, and is not merely a special effort. On this depends the value of Tresidder's and Harvey's processes. It is desirable to ascertain that success can be counted on, and that the plates can be brought to any desired form. With regard to Harvey's process, it is now confidently stated that it does not lend itself to the manufacture of curved plates, and that the cost is very great.

Armour-piercing projectiles.

The manufacture of armour-piercing projectiles has been further developed in this country during the past year. Steel shells of large capacity are now made for the perforation of the lighter plates, combined with great explosive effect.

Hadfield's steel projectiles.

The forged-steel projectiles for attack of the heaviest armour are made at Elswick, by Firth and also by Hadfield. The 6-in. shells of the last named have been used largely in the testing of plates, as noticed above, and have achieved results equal to any obtained on the Continent. The following examples are reported

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and may be noted. A 6-in. projectile taken at random from a service supply perforated a 9-in. compound plate without injury, and on being fired a second time repeated the feat without injury. A 6-in. shell with a large capacity core (over 100 cubic in.) perforated a 6-in. compound plate, passed on nearly 1½ miles beyond it, and was found with no further injury than about ¼ in. of metal broken from the point.

The general rules for the attack of armour may be here again repeated.

Rule of thumb as to firing at armour.

The following *rule of thumb* for armour piercing admits of proof on certain assumptions, and may be found useful.*

Take the calibre of the gun as a measure of the armour, and it will be found that no shot can perforate a plate unless it has over 1000 ft. velocity for each calibre in the thickness. Thus an 8-in. projectile must have over 1000 ft. striking velocity to perforate an 8-in. plate. It must have over 1500 ft. velocity for a 12-in. plate, over 2000 for a 16-in. plate, and so proportionally.

For many guns firing projectiles of medium weight in proportion to their calibre, the direct perforation is very close to one calibre for every 1000 ft. striking velocity.

Oblique fire.

In *oblique fire* the perforation is found by multiplying the direct perforation into the sine of the angle made by the axis of the shot with the face of the plate, unless this angle becomes too oblique for the shot to bite, which will generally be the case below 45°,† even with armour below the power of the shot. At sea this calculation is seldom useful, because the angle of incidence is seldom known,‡ so that the maximum effect possible (*i.e.* direct perforation) is more important. In a siege, however, oblique perforation might be required.

Old-type guns and a few new guns firing projectiles of large calibre in proportion to their weight have less penetration than that given by the above rule; while guns discharging projectiles, like some of Krupp's, with a calibre which is very small in proportion to their weight, may obtain greater perforation than given by the rule of thumb if fired under very favourable conditions.

On the whole, then, it may be concluded that it is useless to fire at wrought-iron plates with less than 1000 ft. striking velocity for each calibre in the thickness of the plate attacked, further allowance

* For more full directions, see *Annuals* for 1886, 1887.

† With steel-faced or steel armour the limiting angle is about 35° with the normal, or 55° with the face of the plate.

‡ A vessel attacking a fort might increase the resisting power of her side armour by maintaining an oblique position.

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being necessary with old-type guns, in oblique fire, and also some allowance for backing.

Diagrams. For immediate use in connection with service guns, projectiles, and charges, the late General Inglis prepared a diagram on which perforations can be read off at a glance. If the charge differs from that specified on the diagram, the perforation for any given velocity is correctly shown, but the range at which this is marked will no longer be correct. In diagrams and calculations it is well to take iron which is of uniform quality as the basis, and to apply a correction for steel or compound plate. These are subject to variation, and constantly improve as time goes on.

General Maitland made a diagram which may be employed for any question of perforation of iron. It is less quickly used and less simple than that of General Inglis, but it is available for experimental and irregular conditions, it gives more information than any other, and in using it an actual process of calculation is mechanically performed which is perhaps more perfect in theory than any other known in England.

The diagrams, Pls. V., VI., VII. and VIII., are again repeated this year. To give to these diagrams a definite practical character, the following course has been followed.

On the supposition that 3000 yards is the maximum range at which side armour will be systematically attacked, all projectiles perforating up to 3000 yards are shown with a clear blank hole. For every perforation effected only at shorter ranges, the limit of range is entered in or near the hole. Thus, any officer finding armour corresponding to that of his enemy with a blank hole opposite his gun on the diagram, may hope to perforate *with a direct hit* at least up to 3000 yards. Should he find a number less than 3000 yards entered, he must not expect to perforate beyond the range so entered.

The armour is wrought iron. It is only approximately representative. The types are chiefly French. The perforation includes backing and skin.

General Maitland's diagram, or Major Willoughby's scale, has been used for calculating loss of velocity at each range. On service each hit would have less power to perforate than is indicated on the diagrams, in proportion as it strikes more obliquely.

The diagrams must be regarded as only approximate. They may, however, be of practical value, for an officer may be able to see at a glance that some ship's armour is *well within the power of his guns* or *quite beyond them*, and behave accordingly.

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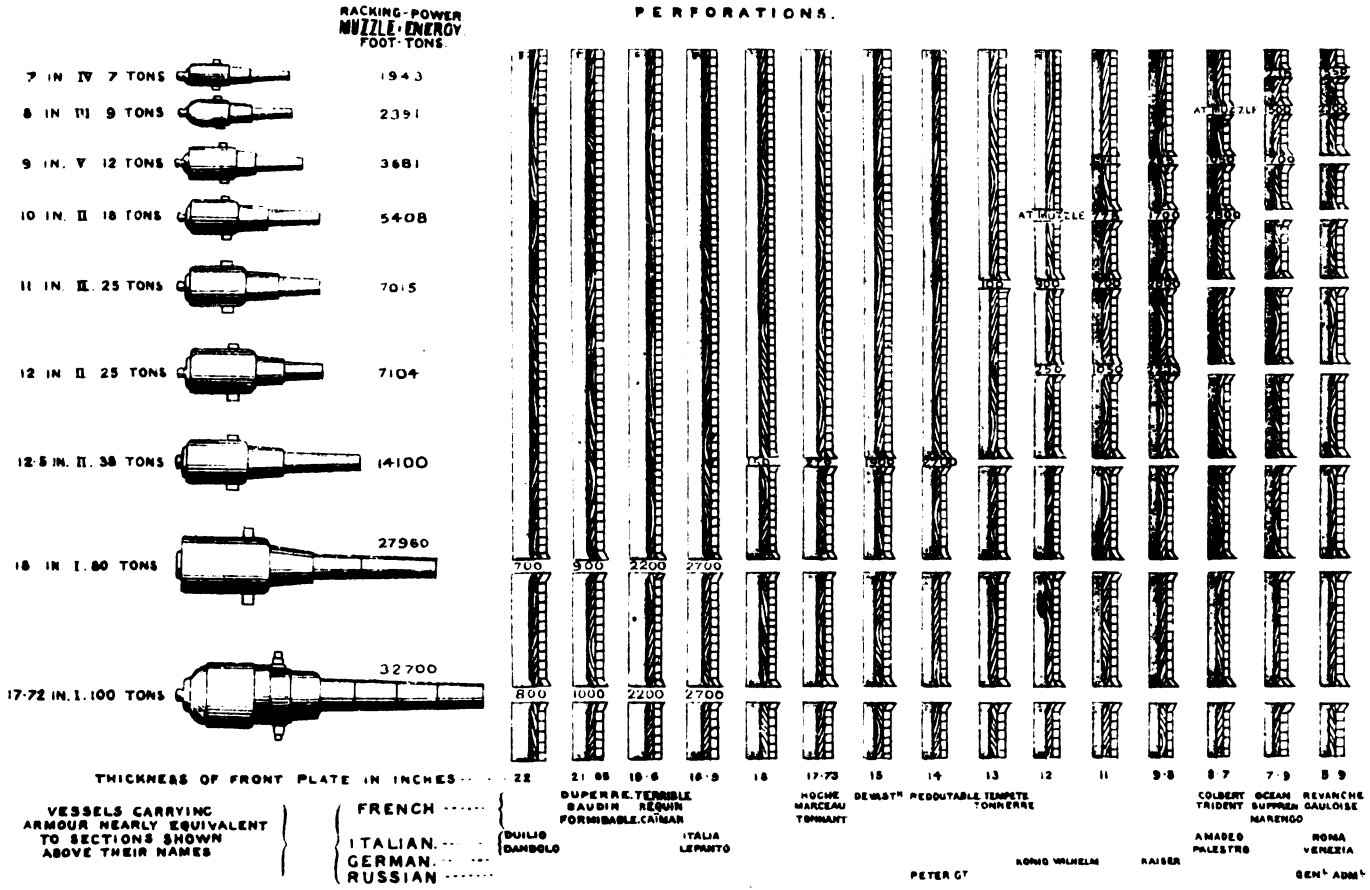
BRITISH M.L. GUNS.



A HOLE WITHOUT FIGURES MEANS PERFORATION UP TO 3000 YARDS: MAXIMUM RANGES OF PERFORATION LESS THAN 3000 YARDS ARE MARKED IN FIGURES.

SCALE - 20 FEET TO AN INCH. SHADED GUNS ARE CORRECT IN GENERAL OUTLINE, DOTTED GUNS ONLY AS TO LENGTH.

ALL BACKING IS 18 IN. OF WOOD WITH 1½ IN. SKIN

P1. V.

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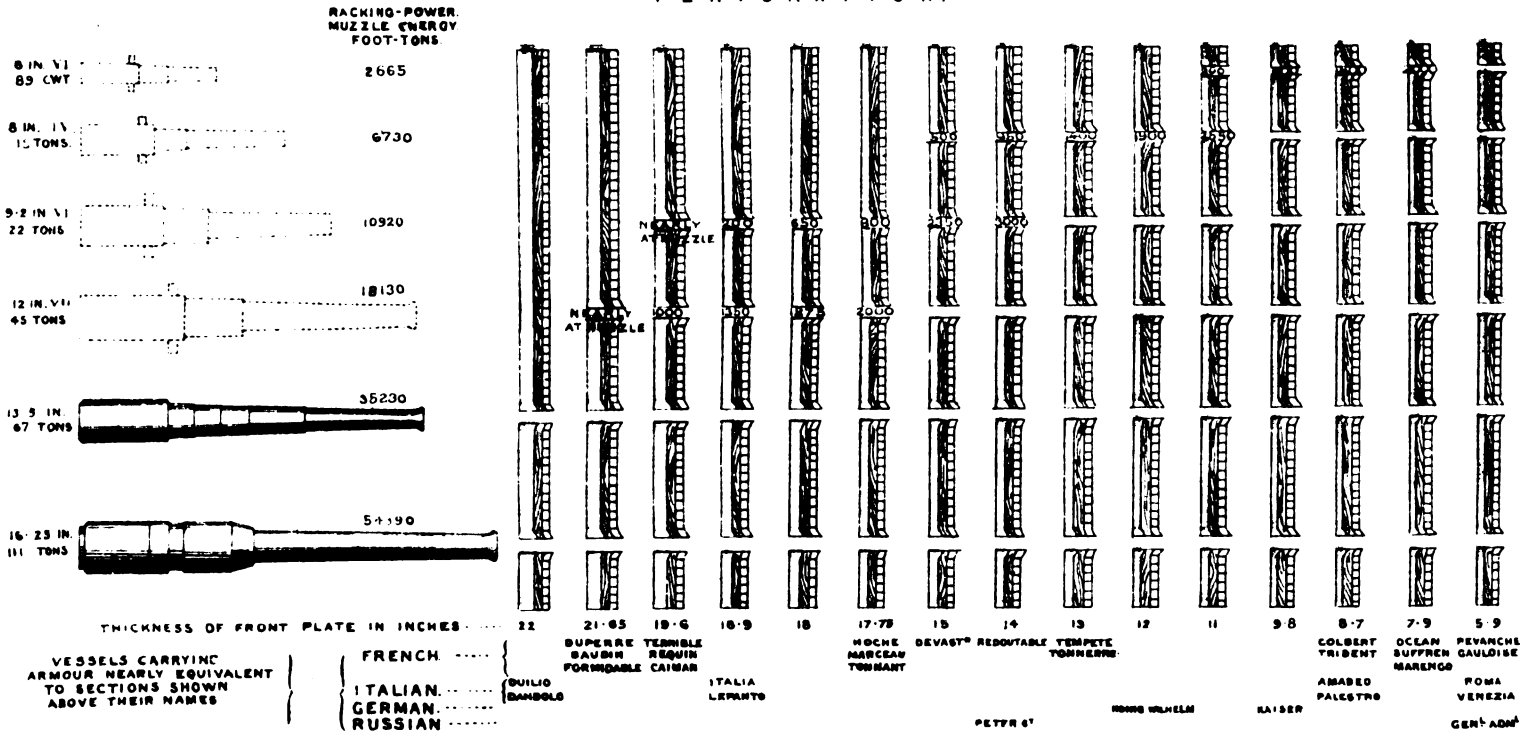
BRITISH B.L. GUNS.

PERFORATION.



A HOLE WITHOUT FIGURES MEANS PERFORATION UP TO 3000 YARDS: MAXIMUM RANGES OF PERFORATION LESS THAN 3000 YARDS ARE MARKED IN FIGURES.

SCALE - 20 FEET TO AN INCH. SHADED GUNS ARE CORRECT IN GENERAL OUTLINE, DOTTED GUNS ONLY AS TO LENGTH.

ALL BACKING IS 18 IN. OF WOOD WITH 1½ IN. SKIN.

PI. VI.

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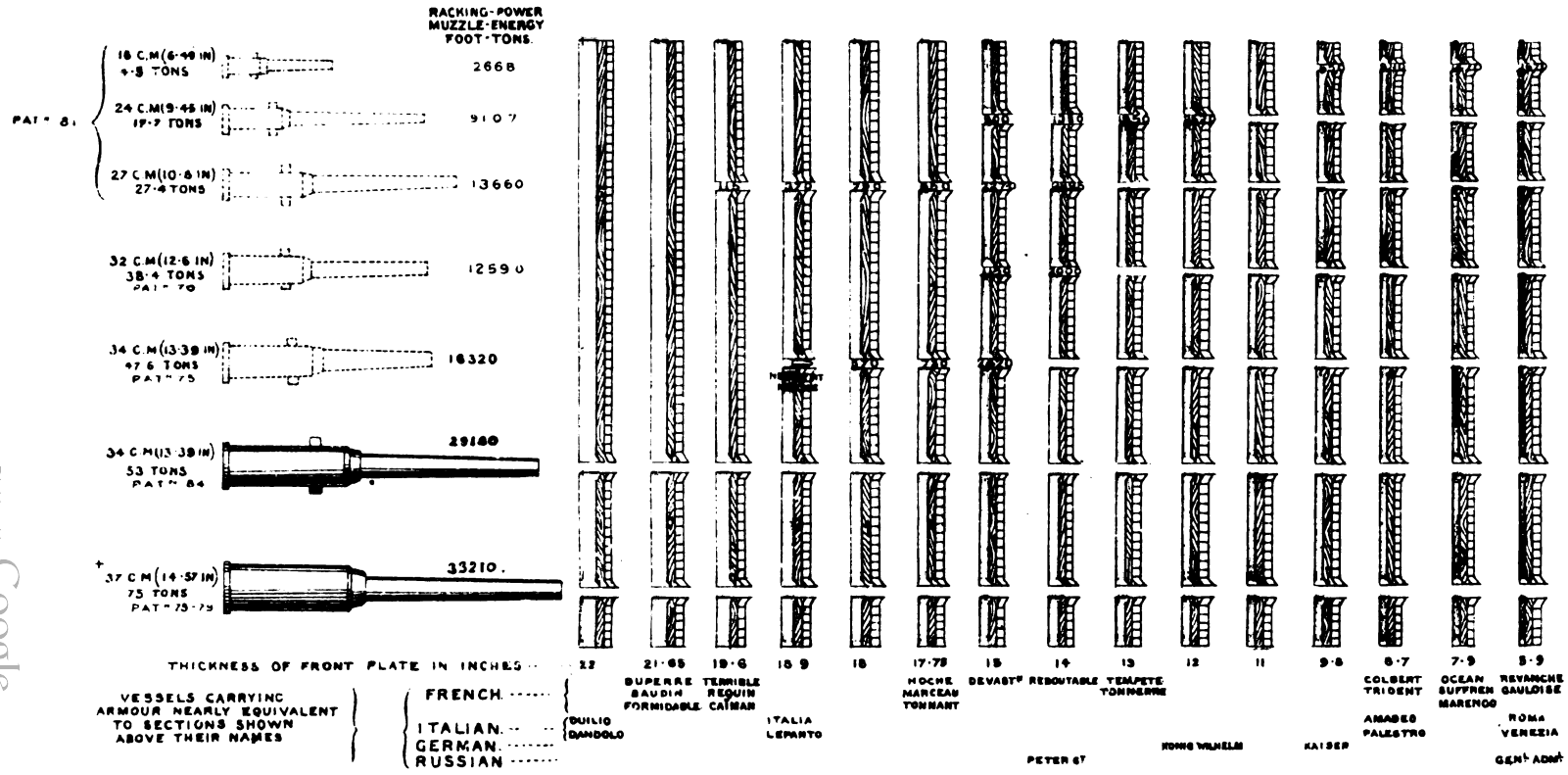
FRENCH GUNS.

PERFORATIONS.



A HOLE WITHOUT FIGURES MEANS PERFORATION UP TO 3000 YARDS: MAXIMUM RANGES OF PERFORATION LESS THAN 3000 YARDS ARE MARKED IN FIGURES.

SCALE - 20 FEET TO AN INCH. SHADED GUNS ARE CORRECT IN GENERAL OUTLINE, DOTTED GUNS ONLY AS TO LENGTH.

ALL BACKING IS 18 IN. OF WOOD WITH 1½ IN. SKIN.

+ A GUN OF 42 C.M OF OLDER TYPE PATTERN 1875, WEIGHING 74·6 TONS IS SHOWN IN TABLE WITH MORE ENERGY THAN THE 37 C.M GUN HERE DEPICTED, AND NEARLY EQUAL PERFORATION SEE TABLE OF FRENCH NAVAL ORDNANCE.

P1. VII.

HANHART LITH.

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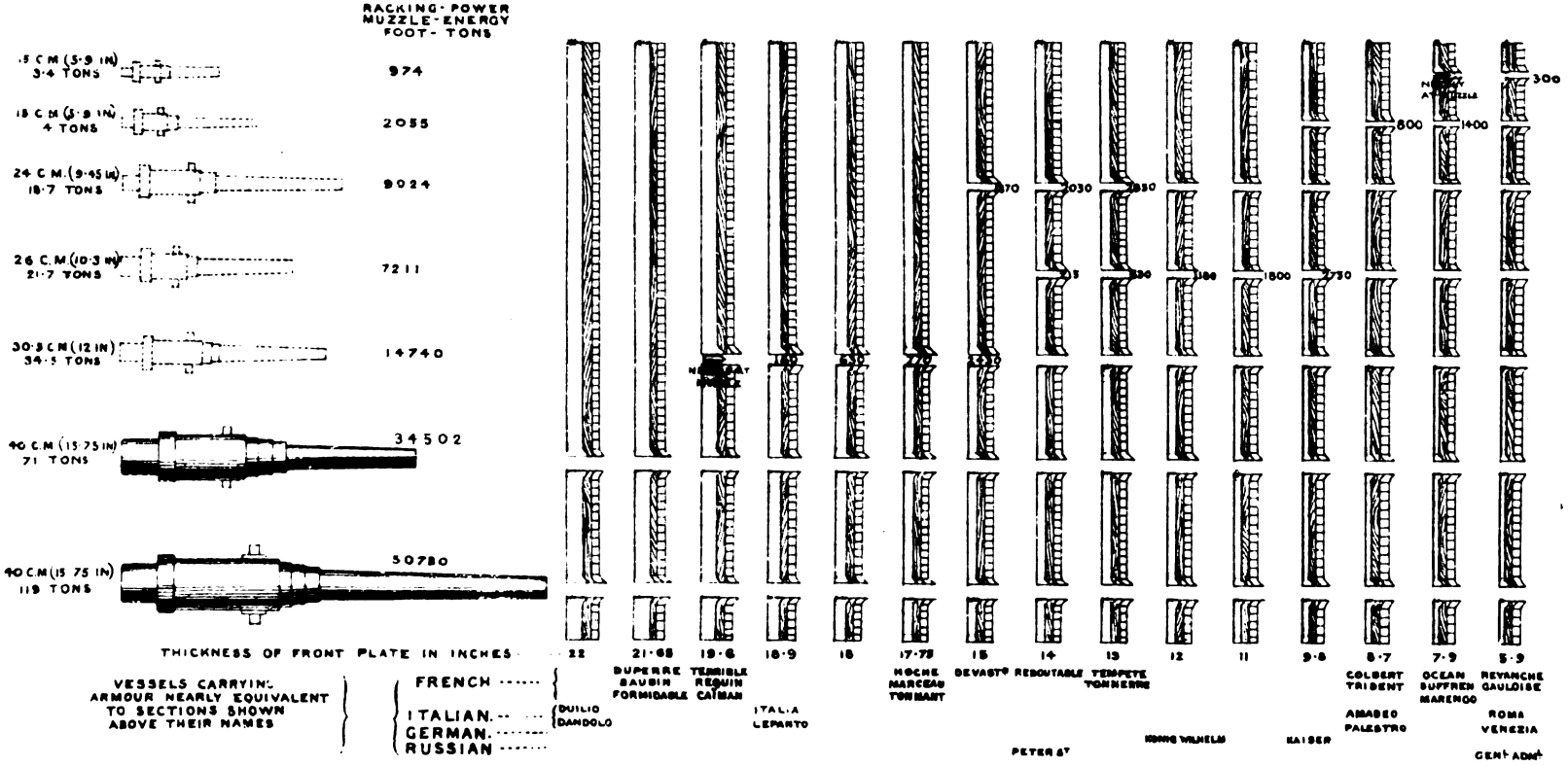
GERMAN GUNS

PERFORATION



A HOLE WITHOUT FIGURES MEANS PERFORATION UP TO 3000 YARDS: MAXIMUM RANGES OF PERFORATION LESS THAN 3000 YARDS ARE MARKED IN FIGURES.

SCALE - 20 FEET TO AN INCH. SHADED GUNS ARE CORRECT IN GENERAL OUTLINE, DOTTED GUNS ONLY AS TO LENGTH.

ALL BACKING IS 18 IN. OF WOOD WITH 1½ IN. SKIN

P. I. VIII.

HANHART LITH

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All armour-clad vessels built prior to 1876, and many subsequently, are *iron*-plated. To these the above directions apply. The question may naturally be asked, why ships clad in steel and compound armour are treated as if only sheathed in the same thickness of wrought iron. The reply is, that the object is to furnish a low limit for guns available for attack. In experimental firing, steel and compound plates have often been attacked and have suffered when projectiles have been employed just capable of perforating wrought iron of the thickness of the steel in question. The yielding is more or less by fracture, and is a gradual process; still it would not be right to fix the limit higher, and to say that guns capable of such effects were useless for attack of such armour. Some very soft steel armour exists approaching wrought iron in quality, though how closely it is impossible to say. It is probable, however, now that steel and compound armour have come in, that it may soon be desirable to deal with ships' armour on a different plan. The destruction of steel by fracture is a slow operation, seldom practicable at sea. If perforation only be considered, steel is estimated to be better than wrought iron in the proportion of 5 to 4; that is, 5 in. of iron is equal to 4 in. of steel.

Why perforation given of wrought iron.

Hard armour, including chilled iron and perhaps some of the harder steel and compound plates, cannot be perforated, and must be broken up before the structure behind it can be injured materially. A single hit will seldom do more than injure the armour itself. The harder kinds of such armour would suffer more than wrought iron from the continued fire of comparatively light guns. The smashing effect of a projectile on hard armour is probably in proportion to its *total energy*, irrespective of calibre.* It is difficult to apply any rule to the case of hard armour, but it is desirable as far as possible to concentrate and continue the fire about the same spot, and all guns are available for such work. Such an operation may seldom be feasible in engagements between ships.

Hard armour.

* How greatly the power of guns to "smash" hard armour may differ from their powers of perforation may be seen by the fact that the 10-in. old-type and 6-in. new-type guns on board the Nettle have nearly equal perforation, while the former has double the energy or smashing power (*vide* Diagrams) of the latter.

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II.

ORDNANCE.*

IT may be desirable to begin the subject of ordnance by noticing the general position and functions of ships' primary batteries of heavy guns, and of the secondary batteries which will in future consist of quick-firing guns. The quick-firing action, which originally came in with light guns to repel torpedo-boats, is now applied to 6-in. guns firing projectiles weighing 100 lbs., whose energy at the muzzle is 3994 foot-tons. That of the old 68-pounder smooth-bore hardly reached 1200 foot-tons. As the range increases the difference becomes greater; consequently, we now deliver quick-fire from pieces between three and four times as powerful as any carried by our old three-deckers, and it naturally follows that our quick-firing armaments take much of the work which belonged formerly to our primary batteries.

Relative powers of primary guns and quick-firing armaments.

To take the case of heavily armoured ships of the first class: the Hood and Ramillies classes comprise eight vessels, each of which mounts four 67-ton guns and ten 6-in. quick-firing guns, eighteen smaller quick-firing guns, as well as eight machine guns. It is interesting to inquire what weight of metal could be discharged, and what energy of fire obtained, from the primary and secondary guns in any given time. Suppose, then, the ship to enter the field of action with her pieces loaded. It is said on good authority that under these conditions a 67-ton gun may fire four times in nine minutes. The weight of the projectile is 1250 lbs., the muzzle energy 35,217 foot-tons; consequently, in nine minutes four guns might discharge 8·9 tons of metal, having a total muzzle energy of 563,472 foot-tons. The 6-in. quick-firing guns are said to fire six times a minute. The projectile weighs 100 lbs. In nine minutes, then, 24 tons of metal might be thrown from the ten guns, with a muzzle energy of 1,438,020 foot-tons. Supposing half of the eighteen smaller quick-firing guns to be 6-pounders, and half of them 3-pounders, and each piece

* *List of Authorities.—The Engineer, Times, Engineering, Génie Civil, Austrian Almanach der Kriegs. Flotten for* 1892, 'U.S. Institution Papers,' 'Modern Naval Artillery,' &c.

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to fire fifteen times each minute, they would discharge 5 tons of metal, with a muzzle energy of 266,085 foot-tons. The total weight of metal and energy of the secondary batteries of quick-firing guns then would amount in nine minutes to 29 tons and 1,704,105 foot-tons per second respectively, as compared with 8·9 tons of metal and 563,472 foot-tons energy for the heavy guns.

This is, however, not a reasonable method of comparison, because while under most conditions the four heavy guns could all fire, probably only about half the secondary guns could do so, so that the more fair comparison would show 14·5 tons of metal and 852,053 foot-tons for the quick-firing armament against 8·9 tons and 563,472 foot-tons for the heavy guns. It may be objected, no doubt, that the rate of fire taken, although not the full maximum given for quick-firing guns, would never be realised on service. Probably the same is true for the heavy guns. The main value of any such comparison as the above is to show that, for general purposes of destruction of lighter structures and *personnel*, the quick-firing armament decidedly surpasses the heavy one, though for perforation of armour and really heavy blows the latter is necessary. If this is the condition of things in a first rate armour-clad ship, the importance of quick-firing guns, which constitute the entire armament of many of our cruisers, may be fully seen. One important element in the introduction of quick-firing guns also which may escape recognition, is the power to carry an increased supply of ammunition, a most important matter if ships are employed in prolonged operations against an enemy's coast. No ordinary gun receives a supply of ammunition approaching in weight and bulk that of its own body, carriage, and slide. Consequently, supposing that one quick-firing gun is equal to two ordinary ones and replaces them, it will be able to carry the weight of one gun, carriage and slide in extra ammunition, amounting to considerably more than the ammunition supplied to a third gun.

Accidents and casualties occurring with guns.

It is important to meet the report of accidents occurring to our heavy guns fairly, seeing that the reputation of English *matériel* has undoubtedly suffered on the Continent for some years past owing to such reports. When a statement is made, for example, in the French Chambers "that English guns have an insecurity of which all the governments who have had the imprudence to buy them know the costly consequences," it is time to examine the grounds for such statements. Any accidents which have occurred would naturally furnish the most substantial grounds. Any actual condemnation of guns on the ground of insufficient theoretical strength would also be to the point. In England, France, and Germany fatal

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accidents have occurred since new-type guns came in, but happily so rarely, that probably the whole together could be counted on the fingers of one hand; in fact, it is questionable if more than one fatal accident has occurred with each nation with guns of new type. Fatal accidents may fairly be separated from others, because, while the former are sure to become known, the latter may be kept from becoming public; consequently, fatal accidents form a test applicable to the guns of all civilised powers to a certain extent.

Accidents with British and Foreign guns.

In England several guns have given way by bursting in the forward part, when no injury has been done to life or limb. In Germany no burst has been reported either with old-type or new-type guns without actual loss of life. This might be due to the fact that the breech was the weakest place, but the other explanation cannot fail to suggest itself, namely, that the German press does not get hold of information of this kind to the same extent as the press in England. Be this as it may, however, we know that several British new-type guns gave way in the forward part some years ago, and a strengthened pattern came in to meet the requirements of the slow-burning powder which had brought an unexpected strain on the muzzle end of the gun. This history happily comes under the head of accidents which were not fatal, and also of supersession of patterns on the ground of weakness. In the *Annual* of 1890 was quoted from *La Nouvelle Revue* a much more serious account of supersession of pattern of French guns, even allowing a large margin for exaggeration; and in a series of articles on Canet and Krupp guns, published in *Engineering* during the last winter, failures of Krupp guns to fulfil expectations at Spezzia and on board the Russian ship Tchesma are quoted.

Bursting of gun on board H.M.S. Cordelia.

To come to accidents in detail. On June 29th, 1891, a 6-in. breech-loading gun burst explosively at its seventh round on board H.M.S. Cordelia during gun-practice, while the vessel was proceeding from the Fiji Islands to Noumea. The gun in question, No. 3 on the port side, had been charged with common shell. On firing, nearly all those who stood round the gun were killed. The breech-block and huge fragments of the gun and carriage were hurled across the deck, and smaller ones were projected hundreds of yards away to sea. A burst of this character has not occurred since that on board the Thunderer, which was fairly traced to double loading. Consequently, it may be said that such an accident has hardly occurred in the British Service since the first introduction of wrought-iron ordnance about 1859. The fracture of guns near the muzzle by slow-burning powder mentioned above was a matter admitting of a simple

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remedy, and happily caused little danger to life. The explosive rupture of a gun at the breech is from every point of view the most serious accident that can occur. The greatest loss of life is caused, and the piece is proved to be fundamentally weak. As to the Cordelia gun, it is happily true that this pattern had been superseded by a much stronger one when the accident occurred, and the whole of the weaker pattern have since been withdrawn. The known weakness of a gun is, however, no valid excuse for its bursting, because the charge ought to have been limited to the powers of the gun, and a plea of weakness compared with other patterns to have any force, must mean that the margin of safety was less than was desirable. The only other solution is, that either from some wedging or owing to the powder (from heat or other cause) acting in an abnormal way, the gun happened to be exposed to a strain defying all reasonable provision. In this case it is one more plea for some modification of our present enormous charges of powder, which act admirably when they burn in the scientific way in which they ought, but occasionally do not, as the Italian Commission on the Duilio gun and French Commission on the Duperré gun seemed to think.

Bursting of Krupp 15-cm. gun.

The *Génie Civil* reported in October 1891: "An official trial has just taken place at Horten of a Krupp 15-cm. (5·9-in.) gun. At the first round, with a charge of 24-kg. (52·9 lbs.), the gun exploded, killing one man and wounding an officer seriously. The rupture took place a little behind the trunnions; pieces of the gun were projected to the distance of 130 metres. The gun was intended for the Norwegian gunboat Viking." This is happily a less fatal but quite as significant accident as that last recorded.

111-ton and 67-ton guns.

Some casualties, chiefly of a trifling character, which occurred with British heavy guns have been greatly exaggerated. They were as follows. One of the Victoria 111-ton guns exhibited a small fault at the muzzle, and it was considered desirable to remove a few inches. This was the most serious casualty. One of the Anson 67-ton guns, which was purposely fitted with a "liner" so as to enable the part of the bore which suffers most from erosion to be replaced with minimum cost, had this operation performed. There was a report that one of Howe 67-ton guns had something wrong with it. This turned out to be untrue, and the gun remains mounted and at its work. The Benbow guns, which were the first 111-ton guns made, had slightly narrower grooves than their successors. The removal of these guns to have their grooves deepened was suggested, but not carried out. These two last cases are not casualties at all, but it is necessary to mention them to pre-

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vent the impression that actual ones had occurred and escaped notice.

Life of a heavy gun.

The number of rounds which a heavy gun will fire before becoming unserviceable is unfortunately very small. Probably no better authority on this subject can be quoted than a work brought out last autumn on Elswick *matériel* under the title 'Modern Naval Artillery.' In this it is stated that "it is generally considered that the life of the 67-ton gun may be taken at 120 rounds, and the 111-ton gun at 75 rounds, both with full charges. The wear and tear occasioned by the full, three-quarters, and half charges may be considered to be in the proportion of three, five, and ten; thus, the 67-ton gun could fire 400 half-charges or 200 three-quarter charges, and the 111-ton gun 250 half-charges or 125 three-quarter charges."*

Maxim on erosion.

Maxim has proposed a peculiar and ingenious form of gas-check in order to prevent passage of gas and erosion. The projectile is moved through the medium of a soft metal washer, which becomes subject to great pressure, and set up into a space against a supporting shoulder round the base of the projectile. Any design of Maxim's deserves consideration, but the best authorities do not seem to hope much from this device.

Krupp, Canet, and Armstrong guns.

The question of the work performed by guns and the consequent strain imposed on them naturally connects itself with accidents from rupture. A fair comparison of the guns of rival establishments is difficult. Guns of increased power are constantly being made, so that, even if the latest results could be obtained from all makers at any given date, one might have just made a step which was on the point of being rivalled or surpassed by another. When the increase in power is due to increase in length, however, the matter is comparatively plain. When it is due to the employment of new powder, the question is beset with difficulties which baffle any attempt at fair comparison of guns. Latterly, Krupp, Canet, and Armstrong have furnished information so readily in reply to questions that it would be inexcusable to do injustice to any of them. The object of the quotation about to be made from the *Austrian Naval Almanac* of 1892 is not to represent the comparative powers of the guns of the makers strictly, for, as above noticed, the guns in question may not now represent their fullest development; but to show that in the beginning of the present year, when the statements referred to were made, Armstrong guns were giving an

* The wording of the paragraph is so awkward that it is only understood by using common sense and the application of the figures. It means that the numbers of rounds that can be borne are in the proportion of 3, 5 and 10; 3 with full, 5 with three-quarter, and 10 with half charges.

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amount of energy, and consequently being subjected to a strain which was greatly in excess of that borne by other guns. The 6-in. guns of as nearly the same length as can be found, shown on pp. 59–66, have the ballistic powers shown in the following table :—

Maker of Gun.	Calibre.		Length.	Weight of Gun.	Weight of Projectile.	Muzzle Velocity.	Muzzle Energy.
	cm.	inches.	calibres.	tns.-metric	kilogr.	metres.	metre-tons.
Armstrong . .	15·2	6	42	5·5	45·3	748	1,292
Canet . . .	15·0	5·9	43	7·6	42·0	740	1,172
Krupp . . .	15·0	5·9	40	5·6	51·0	630	1,032

The energies per ton are—Armstrong 235, Canet 199, and Krupp 184 metre-tons. There is shown a longer Canet 15-cm. of 50 calibres, weighing 8·55 tons; such a gun could not be compared with those of 5·5 and 7·6 tons. Its total muzzle energy, however, is 1370, and consequent energy per ton is 160 metre-tons. In this case, it is needless to point out that if one gun gives 17 per cent. more energy per ton than another, it must follow that the former can only have the same margin of strength as the latter by being a much better and stronger gun. Supposing that this is not admitted to be the case, it would be easy to reduce the charge, and to be content with the same result obtained by the French and German guns. Unless that is done, it is obvious that much more is being expected from the Armstrong gun than the others.

Turning next to heavier guns, the following are somewhat similar in conditions :—

Maker of Gun.	Calibre.		Length.	Weight of Gun.	Weight of Projectile.	Muzzle Velocity.	Muzzle Energy.
	cm.	inches.	calibres.	tns.-metric	kilogr.	metres.	metre-tons.
Armstrong . .	34·3	13·5	42	88	567	709	14,949
Canet . . .	34·0	13·4	43	88·5	480	740	13,399
Krupp . . .	35·5	14·0	40	90·8	725	720	14,666

The Krupp gun is here much the heaviest, and should be the most powerful. The work per ton metric of gun for each is—Armstrong 170, Canet 151, and Krupp 162 metre-tons.

On the general question of "Heavy Guns *versus* Light," a paper was read at the United Service Institution on April 22nd, 1891—Admiral Sir Thomas Brandreth being in the chair—by Mr. Quick, Fleet

Quick on heavy guns *versus* light.

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Engineer. The lecturer urged the employment of very heavy guns as a more economical and efficient application of power than can be obtained by light or medium guns. This position he supported by actual calculations and figures. He recommended, however, a gun of a construction in which screwed unions and stiff tubes were to be employed on a system of his own, and with his own breech mechanism. There was very little discussion on this important question, owing probably, as Admiral Colomb observed, to the mixture of general and specially technical matters in one paper. It was quite clear, however, that the general opinion among the naval officers present was against very heavy guns.

The working of heavy guns.

The question of the relative advantages of hydraulic and hand power for working guns has been studied and kept in view in the rearming of the Thunderer and other vessels with new-type guns. Speaking generally, the advantages of hydraulic working are so great that it has been preferred, every effort being, however, made to provide alternative hand-gear. An interesting trial as to rapidity of working heavy guns on board ship was recently made with highly trained crews, the results of which are given in the following table*:—

Ship.	Description of Gun.	How Worked.	Results.
Colossus . . .	12-in. 45-ton B.L. . .	Hydraulic.	4 rounds in 6 minutes. (Target struck 3 times.)
Trafalgar . . .	13·5-in. 67-ton B.L. .	"	4 rounds in 9 min. 7 secs.
Benbow . . .	16·25-in. 111-ton B.L. .	"	3 rounds within 6 minutes. (Started with gun loaded.)
Thunderer . . .	10-in. 30-ton B.L. . .	Hand.	1 round in 2 min. 10 secs.
Impérieuse . . .	9·2-in. 22-ton B.L. . .	"	5 rounds in 6 minutes.

The heaviest guns worked by hand are the new 10-in. guns on H.M.S. Thunderer.

Engagements between ships and coast batteries.

A mounting for howitzers for high-angle fire and attack of decks has been tried with success by Whitworth (being the design of Canet).† Coast defence generally has received attention both in England and abroad. The views held on the matter at present differ widely, and may probably continue to do so, until actual war solves many of

* Taken from 'Modern Naval Artillery,' p. 43.

† This class of mounting has been sufficiently illustrated in previous volumes of the *Annual*. An illustration of the Whitworth-Canet design was given in the *Engineer* of July 24, 1891.

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the doubtful points. Judging from papers written in the *Revue d'Artillerie* by Captain Favre, it would appear that in France it is thought that coast batteries would suffer so severely from shrapnel and shells charged with high explosives, that ships could very quickly disable them. It is even urged that ships could effectually shell a fort from a range of 10,000 yards. The main ground for this idea is that in experiments on the Continent shells charged with high explosives have effected such wholesale destruction on the structures attacked, that the conditions of frontier defence have been altogether upset. In Germany, shells charged with wet gun-cotton coated with an envelope formed by pouring in hot paraffin were considered far superior to those filled with melinite. In England very opposite conclusions have been arrived at from experiments. The precise results of the trials against the Resistance at Portsmouth in 1889 were kept in strict confidence; but enough is known to show that ships as well as forts suffer terribly under the fire of shells charged with high explosives. In 'Modern Naval Artillery,' p. 78, it is stated that "various explosives were fired in 9·24-in., 6-in. and 4·7-in. shells," and that "none but those who had witnessed the trials could picture the wholesale destruction caused by these shells." Of the dummy men, scarcely one in the vicinity of a bursting shell escaped; but one of the most remarkable features was the terrible "smoke and fumes after each explosion, which set fire to the ship and prevented anyone approaching the spot, in some cases for twenty minutes after the shell had burst."

Resistance trial.

In the same work, p. 12, will be found remarks on results obtained by howitzers fired at high angles, both in experiments carried out at the Isle of Wight and in Italy, from which the writer concludes that a ship runs a risk of being placed *hors de combat*, if not absolutely destroyed, by a single shell falling on her deck. Probably most readers will consider this too strong; nevertheless, while the effect of such a shell might be interfered with by its fracture against gear mounted high up in the ship, it might undoubtedly be very serious.

In England, with Colonel Watkins' system of position-finding, it is estimated that one gun is worth about sixteen fired in the ordinary way. Moreover, guns can be directed to fire thus accurately at objects completely concealed from view. It has, therefore, generally been concluded that ships would engage land forts at overpowering disadvantage, and that very favourable circumstances only would justify such attack. Certainly most artillery officers would be well pleased to see ships open fire at 10,000 yards, and

Effect of position-finder on coast defence.

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waste the ammunition of which a ship can carry but a very limited supply. The application of special quick-firing guns to coast defence is noticed on p. 320.

High explosives tested in United States.

The Report* of the Chief of the Bureau of Ordnance of the United States (Captain W. M. Folger) gives, as the result of experiments made during 1891, the following:—

"Gun-cotton is undoubtedly the best known explosive for naval uses. It is safer in manufacture, handling, and transportation even than gunpowder; it is quite insensitive to shock, will not explode by ignition, is effective at very low temperatures, and wet as well as dry, and does not deteriorate when stored for long periods."

The effort to obtain a less sensitive composition than fulminate of mercury for the detonation of some high explosive has resulted in emmensite being found to offer the advantages of gun-cotton in a great measure, and to be capable of detonation by a less sensitive fuse.

* 'Report of the Chief of the Bureau of Ordnance for 1891,' pp. 7 and 8.

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III.

Quick-firing Guns.*

The important part now played by quick-firing guns has been noticed in the opening of the chapter on Ordnance. England has taken the lead in the embodiment of this class of weapon in the armament of ships. The First Lord stated in the House on March 8th that there were already 1715 quick-firing guns afloat or in reserve. Italy, Germany, Russia, and other Powers have also adopted quick-firing guns to a greater or less extent, and France has at last recognised the danger of being left behind, and is taking active steps to supply her wants, partly by new pieces made by Canet, or in Government factories, and partly by converting ordinary guns to quick-firing pieces.

Discussion in French Chamber, Marquis de la Ferronays.

A discussion which took place in the French Chambers on December 9th last brought out the view taken of the bearings of this important question. The debate on the Naval Budget was opened by the Marquis de la Ferronays, who drew attention to one sentence occurring in the report which had been submitted to them, and which ran as follows:—"Thus, at the end of next year, we shall have at our disposal a certain number of quick-firing guns, of which the majority will be converted." The Marquis de la Ferronays contended that money spent on the conversion of ordinary breech-loaders into quick-firing guns was money thrown away, for he held that a gun thus converted differed only in a single detail from what it was originally; instead of firing one round per minute, it would fire three or four. But no superior ballistic effect, no greater efficacy for combat, was obtained, except the total weight of the projectiles fired in a given time on the enemy. In his opinion the situation was extremely grave, for in the matter of quick-firing guns the French Navy was behind all others. The wars of the future would be

* *List of Authorities.—Engineer*, for plates, &c.; the *Journal Officiel*; *Revue d'Artillerie*; *Génie Civil*; and direct communication from Armstrong, Krupp, and Canet, for information in tables, &c.

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entirely with cannon; for whatever might be the perfection attained by the small arm, it could not compare with the artillery in effect, above all when in the hands of young soldiers. The Naval Administration was to be strongly reprehended for its attitude with regard to this question. Other Powers had fitted their fleets, some with one type of gun, some with another, to such an extent that recently a member of the Italian Parliament stated that a French ship could pour in 10,000 kg. of iron into an Italian ship, and that the latter could reply with 26,000 kg. Whether these figures were correct or not, the fact that such a statement could be made before the Parliament of another country was one of extreme gravity. Now, instead of using the money voted by the Chambers for the construction of the new guns so much needed, it was proposed to expend the greater part of it in the conversion of old guns to the required type; but the danger could not be met thus.

Minister of Marine.

The Minister of Marine, in reply, was sorry to admit that France was not abreast of other Powers in this respect. He said, however, that guns designed by M. Canet had been ordered from the Société des Forges et Chantiers, and also parts were being supplied for the completion of new quick-firing guns at the Ruelle factory. He added that the converted guns were also efficient weapons, though not so powerful as the long guns of new design.

M. Clémenceau.

M. Clémenceau supported the argument of the Marquis de la Ferronays, both as to the evil of the backward position of France, and also as to the inefficiency of the converted pieces. He dwelt specially on the necessity of the sights of a quick-firing gun being fixed on the portion of the carriage or mounting which does not recoil, so as to enable a man to give his attention to laying the gun without interruption, in fact, without withdrawing his eyes from the line of sight.

Director of Artillery.

The Director of Artillery supported the Minister of Marine in his defence of the converted gun. He stated that, at the end of 1891, France would possess 100 quick-firing guns, and the following year 250.

Introduction of quick-firing guns in French Navy.

In January last it was decided to arm a number of French war vessels with quick-firing guns as soon as possible. Nearly all new ships are to have a quick-firing armament, but the calibres are not in all cases decided. Many ships already afloat are to receive them, as shown in the following table, by which it may be seen that, putting aside the guns issued for instruction to the gunnery ships, the French fleet will shortly carry 115 quick-firing guns of various calibres.

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cm. in. 15·7 or 6·2	cm. in. 14 or 5·5	cm. in. 10 or 3·9	cm. in. 6·4 or 2·5	cm. in. 4·6 or 1·8		
4	8	..	..	..	Amiral Baudin	Armoured Ships.
..	..	4	..	..	Indomptable	
..	..	4	..	..	Caïman	
..	..	4	..	..	Terrible	
..	..	3	..	..	Achéron	
6	..	4	..	6	Bugeaud	Cruisers.
6	..	4	..	6	Friant	
6	..	4	..	6	Chasseloup-Laubat	
..	4	..	..	..	Forbin	
..	..	5	..	..	Condor	Torpedo Cruisers.
..	..	5	..	..	Vautour	
..	..	5	..	..	Faucon	
..	..	5	..	..	Epervier	
..	..	8	4	4	Foudre, Torpedo Depôt Ship.	
22	12	55	4	22		
115					Total Q.F. Guns.	

Quick-firing guns, relative power of.

The relative powers of various quick-firing guns is an interesting question, but at the present time it is one difficult to decide, because the essence of quick-fire is the actual quantity of fire that can be poured in effectually, and this is influenced by matters which must be settled practically at sea rather than on an experimental shooting ground. The question of magazine provision, complicated as it is by the use of charges containing the elements of self-ignition, and the continuous service of a gun at the maximum possible speed with projectiles and charges weighing over 100 lbs. by men standing on a moving deck, are obviously best tested at sea; consequently, so long as guns are in an early experimental stage, wrong impressions may be formed.* With regard to the French converted guns, it may be sufficient to say that the objections above mentioned are overstated, and the guns are fairly efficient, though inferior in power to the longer weapons. It is only necessary here to discuss the new pieces.

New tables of.

In addition to the tables of naval ordnance of the principal Powers which have been given in each previous *Annual* there will be found in the present one (pp. 335–337) tables of quick-firing guns made by Armstrong, Krupp, and Canet. These tables have been kindly supplied in reply to a special request, and each table consists of the maker's own figures turned into English measures, based either on actual results or estimates, and are brought up to date at the

* In the reply to the German articles on Krupp and Canet guns, the French writer urges on behalf of Canet that the German powder produced erosion, and objects to it as unfit for actual service, and therefore misleading. (See *Engineering*, Jan. 15, 1892.)

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commencement of this year. There are certain points which call for explanation.

High velocities and formulæ for perforation.

First, the perforation assigned to projectiles of high velocity is open to grave question. The French, German, and English formulæ* give results differing but little for the velocities formerly in use. Now, however, that velocities over 3000 ft. per second are contemplated, the formulæ are applied to untried conditions, and the results they give differ widely, the French formula giving the largest and the English the smallest perforation. In the Krupp and Canet tables, the perforations calculated on the English system are added in a line under those supplied by the makers, and the comparison of these at high velocities shows a difference which will be discreditable to science if allowed to continue. It will be necessary to fire projectiles at armour at very high velocities to settle this question.

Effects of experience on Elswick quick-firing *matériel.*

In justice to Elswick it should be pointed out that the development of quick-firing guns has been going on much longer, on a large scale, at Elswick than at either of the other establishments, and this is apparent from the tables. Those furnished by Krupp and Canet are very full and complete, but obviously consist in a great measure of estimated results. For example, 680 m. or 2231 ft. stands as the muzzle velocity of every light quick-firing gun on Krupp's table, and 710 m. or 2329 ft. and 750 m. or 2461 ft. is the muzzle velocity of each heavy quick-firing gun fired under certain conditions. So the heavy guns of Canet of 45 and 60 calibres have respectively 750 m. or 2461 ft. and 860 m. or 2822 ft., which, no doubt, is what the guns are calculated to give and may practically achieve; but it cannot be supposed that these uniform and exact figures are actual results obtained by every gun concerned. This fact is not instanced in any way to throw doubt on the results, but simply to show that the guns dealt with are not to be regarded as having proved their powers and developed to the same extent as those shown on the Elswick table.

Rate of fire.

The same principle applies in a less degree to speed of fire, for, while the rate claimed by Krupp and Canet is no doubt a rate actually achieved, that given in the Elswick table has been realised repeatedly by crews of ships firing at sea under service conditions. In France it is said that the very elements of quick-fire are lost if the projectile is separated from the charge. Doubtless the union of case and projectile may give a better record

* The German formula is that used by Krupp, and the French formula is that of Jacob de Marre, and the English formula is that of Fairbairn, checked occasionally by that of Maitland, or some other which gives practically the same result.

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of a limited number of rounds fired for speed from a fixed platform on an experimental shooting ground; but the stowage of ammunition on board ship, and actual experience in handling the ammunition at sea, has led to the conclusion in England that in the larger calibres it is a distinct advantage to separate projectile and cartridge. The quick-fire principle is still maintained in all other features, that is to say, the ignition and the quick breech movement are the same as in smaller calibres, although the projectile and charge enter the breech separately.

Energy of quick-firing guns.

The actual power or energy of the gun is really a separate question from quick action, but it is as important in these as in other pieces. It may be seen by the tables that Canet obtains most energy from a given calibre, but it is obtained by a length which is not practical for ships. In British ships 40 calibres is considered the full length that can be worked without great inconvenience. Canet's guns of 80 and 60 calibres length are intended for coast service only. He has constructed special mountings for them. With regard both to guns of new proportions and also the system of supplying ammunition, if the fact of the guns being new ones is to be urged against accepting results as tried under service conditions, it should also be pleaded in their favour that, until the guns have been worked at sea, it remains to be seen whether a means may not be found of meeting any difficulties.

It will be seen from the tables that, under service conditions, the Armstrong 6-in. gun has a muzzle energy of 3994 foot-tons, or 629·0 foot-tons per ton of gun, and the 4·7-in. gun 1601 foot-tons, or 771·1 foot-tons per ton of gun. Fired for experiment the 6-in. has 5033 foot-tons energy, or 792·6 foot-tons per ton of gun, and the 4·7-in. gun has 1852 foot-tons energy, or 893·0 foot-tons per ton of gun. Krupp's 40-calibre 15-cm. (5·87-in.) gun has 3163 foot-tons muzzle energy, or 727·1 foot-tons per ton of gun, and his 4·72-in. gun has 1653 foot-tons energy, or 761·8 foot-tons per ton of gun. Canet's 45-calibre 15-cm. gun has an energy of 3703 foot-tons, or 660·1 foot-tons per ton of gun. The Canet 45-calibre 12-cm. gun has a total energy of 1944 foot-tons, or 682·1 foot-tons per ton of gun. This is greater in total amount, but less per ton of gun, than Armstrong's and Krupp's, because the extra length of the piece, while it increases the energy, does not do so in proportion to increase of weight of metal. This is seen to a much greater extent in the case of the long 15-cm. gun of 60 calibres, which has the great energy of 4869 foot-tons, which, however, owing to the increased weight of the piece, is only 489·8 foot-tons per ton

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of gun. The 80-calibre gun of 10 cm. has 2140 foot-tons energy, which is 512·0 foot-tons per ton of gun.

As to speed of fire both Canet's and Krupp's 15 and 12-cm. guns fire respectively about ten and twelve rounds per minute. The Armstrong 6-in. and 4·7-in., which nearly correspond to them, fire respectively seven rounds per minute and twelve rounds per minute. This is shown at the foot of the tables.

Canet quick-firing guns.

On Pl. IX. is given a view of the Canet quick-firing gun adopted by the Russian Government, after a trial of various systems. At some recent trials at Havre it is said that the 12-cm. and 15-cm. guns fired respectively twelve and eight or ten rounds per minute. With smokeless powder a velocity of 880 m. (2887 ft.) was attained, with a projectile of 40 kilos. (88 lbs.) fired from the 15-cm. (5·9-in.) gun. The above-mentioned engraving and facts are from *Le Génie Civil;* the following description is taken from the *Revue d'Artillerie* of last September.

Some quick-firing guns of 10 cm., 12 cm., and 15 cm. (3·9 in., 4·7 in., and 5·9 in.) of 48 calibres of the Canet system figured in the International Exhibition of 1889. In certain trials made by these guns by employing charges of B N powder for guns of 10 cm. and 15 cm., firing projectiles of 13 kilos. and 40 kilos. (28·7 lbs. and 88·2 lbs.) respectively, muzzle velocities of from 770 m. (2526 ft.) have been obtained without exceeding a mean pressure of 2600 kilos. per centimetre (17½ tons per inch). Two years ago, the Société des Forges et Chantiers de la Méditerranée constructed in their workshops at Havre some quick-firing guns on the Canet system of 40, 45, and 50 calibres, the latter being specially designed for coast batteries. Certain new arrangements are embodied in the guns of 12 cm. and of 15 cm. of 45 calibres, which are most commonly constructed. The Chilian Government have recently received guns of this type from this Society for the armament of their cruisers Presidente Errazuris and Presidente Pinto. They were also adopted by the Russian Navy on the 22nd of last July. Pl. IX., Fig. 1, shows the 15-cm. gun in action.

Cannon of 12 cm. and of 15 cm. of 45 calibres, Canet system.

The quick-firing guns of 12 cm. and of 15 cm., of a total length of 45 calibres, are entirely of steel; they discharge projectiles weighing respectively 21 kilos. and 40 kilos. (46·3 lbs. and 88·2 lbs.), with velocities of 780 m. and 750 m. (2559 ft. and 2460 ft.). These guns are composed simply of a tube which extends the entire length of the piece, of a jacket which rests at the back against a shoulder of the tube, and of a conical hoop in prolongation of the jacket to the front. They are provided with a screw fastening, the screw-nut of which is

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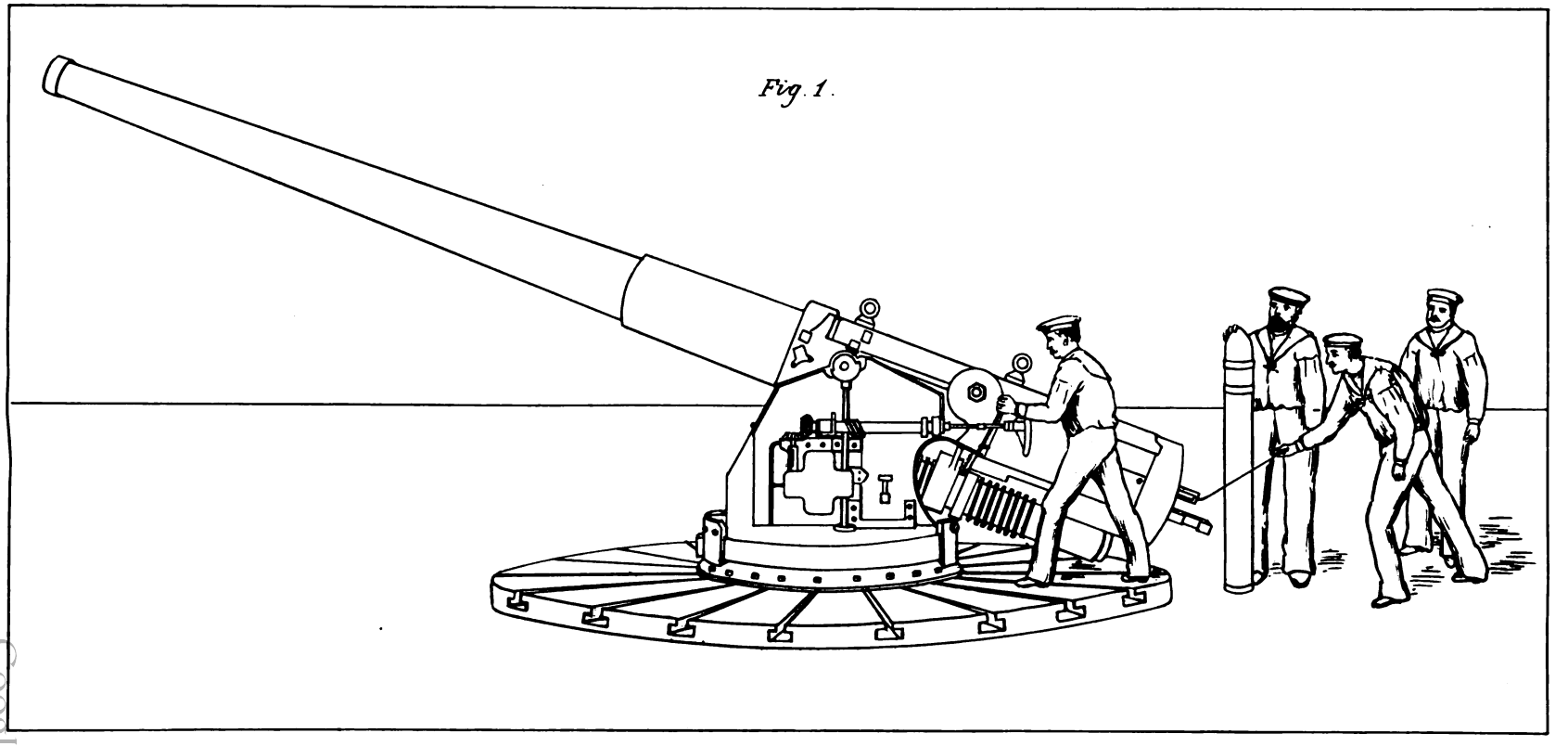
CANET QUICK-FIRE 15 C.M. GUN.



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SECTIONS OF CANET QUICK-FIRE 15 C.M. GUN.

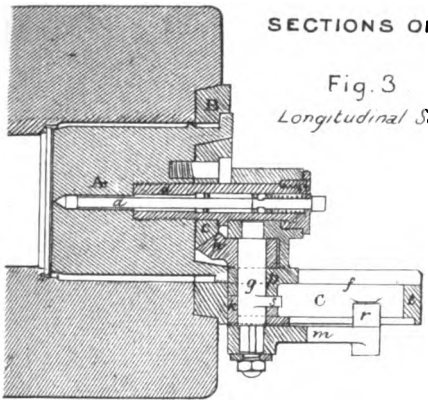


Fig. 3
Longitudinal Section.

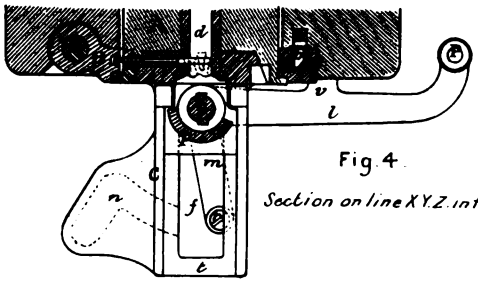


Fig. 4.
Section on line X.Y.Z. in fig 2

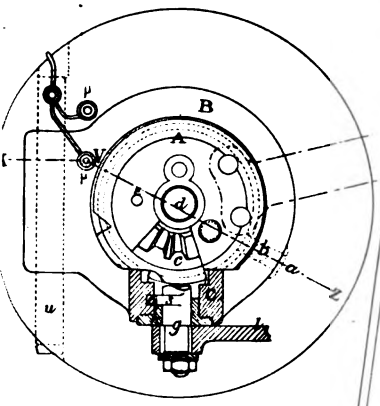
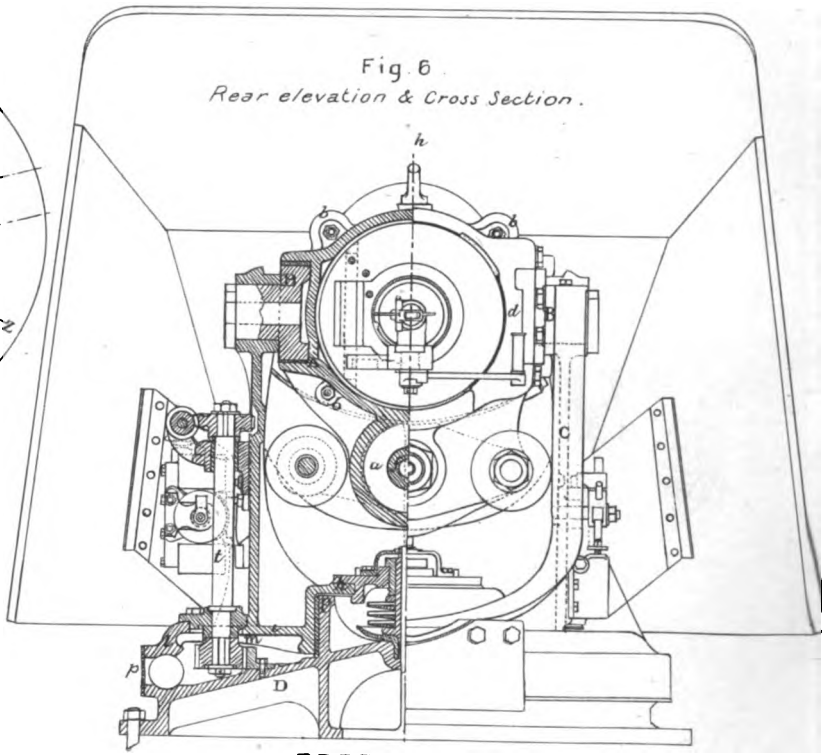


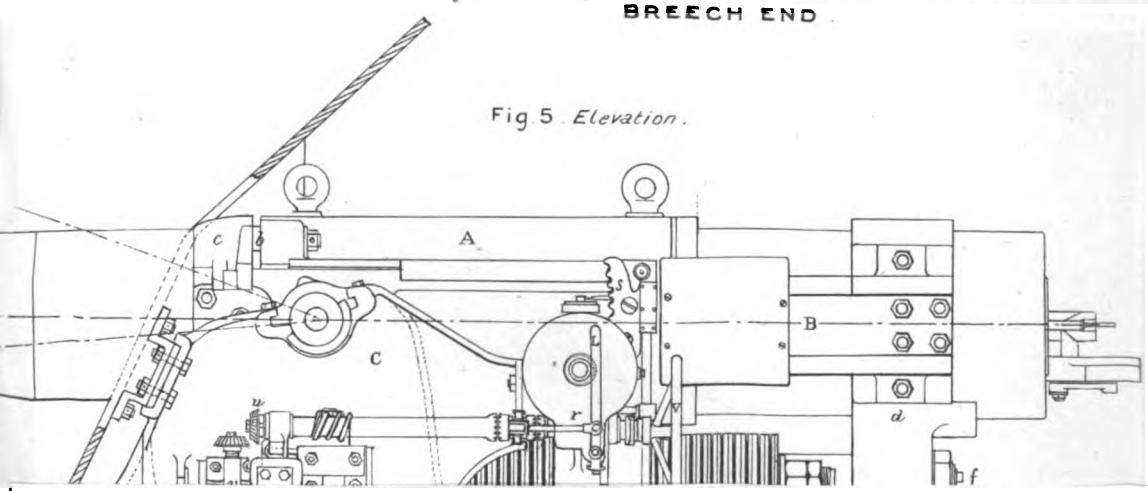
Fig. 2.
Rear elevation.

Fig. 6.
Rear elevation & Cross Section.



BREECH END.

Fig. 5. *Elevation.*



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sunk into the tube. They fire a metallic cartridge fixed to the projectile. The gun of 12 cm. (4·724 in.) weighs 3000 kilos. (2·95 tons), and that of 15 cm. weighs 5700 kilos. (5·6 tons). The mechanism of the breech is shown in Pl. X., Figs. 2, 3, and 4. The breech, on the screw system, is closed in such a way as to allow of the three actions of rotation, of translation, and of moving to the side, being effected by a slight movement of the lever in the required direction. The screw of the breech A, with interrupted threads on four equal sectors, is carried by a shutter B, whose working is insured by the catch *a*, and the bolt *b*, and connected with a bracket *c*. A circular cavity is made in the rear, in which is fixed a ring with two conical gearing teeth *c*; a shaft *d*, screwed to the centre of the breech, prolongs it to the rear. At the bottom of the bracket is a longitudinal groove *f*, along which moves a pivot *g*, turning on a collar K, and on which are fitted:—First, a portion of a cog-wheel *h* on a vertical axis, which gear with the teeth *c*; second, a two-armed lever, the long arm *l* terminating with a handle P, the short branch *m* bearing a roller *r*, which moves in a horizontal groove *n* under the bracket. The groove includes two parts, one being circular, having its centre on the axis of the pivot, the other rectilinear, at an angle with the axis of the gun. The pivot *g* is held to the screw by means of a connecting piece *p*, formed of two sockets at right angles to each other, in which the pivot and the shaft *d* of the screw turn respectively; this piece moves the screw by contact with the head of a plug Q, fixed at the extremity of the shaft. The breech is opened by a single movement of the handle P from right to left. At the beginning of the movement, the rotation of the lever *l* round the pivot G produces the turning of the screw, the teeth (*c*) of which are moved by the cog-wheel *h*; at the same time the roller *r* runs round the circular part of the groove N, and the cog S which is carried by the pivot, passing through the notch E of the bracket, strikes against the back face of the shutter. On continuing to work the handle, the pivot G as well as the screw of the breech are drawn back, while the roller R sweeps the rectilinear part of the groove. At the end of this movement, the wedge R and the lower part of the impelling piece strike the groove end *t* of the bracket, and the whole system thus assembled pivots round the axis *u* of the shutter until the inclined face of the hinge meets the gun; the breech is then fully opened.* The closing is effected by a single motion, by means of a series of reverse movements.

Canet mechanism and action.

* In the guns of 10 cm. and 12 cm. of 48 calibres, the mechanism embodied an arrangement which, united with certain parts of the carriage, automatically performed the opening of the breech, when the piece returned into position after recoil. This arrangement was not maintained in the guns of 45 calibres.

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The action of the lever *l* is limited by a projection *v* which comes into contact with the posterior face of the gun, when the threads of the screw have entirely entered into those of the breech. To prevent the accidental turning of the screw whilst the breech is closed, the lever *l* is furnished with a safety clamp on the body of the gun when the lever has come to an end of its course. When seizing the handle P to open the breech, the gunner bears naturally on it and presses a bell-spring by which the safety lock is made to swing, and so free itself. This apparatus is not represented in the figures. It is further completed by an arrangement designed to allow the opening of the breech only when the shot has been fired, the object of which is to prevent accidents in the case of a hang-fire. The *apparata* for elevation and direction—see Fig. 5—placed on the left side of the carriage can be worked either by hand by means of the same hand-wheel V or electrically. They are organised in the following manner:—Two shafts are mounted with slight friction on an axis on the left side of the gun-carriage, the shaft behind having an endless screw *r*, which gears with a toothed wheel whose movement is transmitted by an intervening cog-wheel to the elevating arc S, fixed on an oscillating frame; the front shaft being equally provided with an endless screw r^1, working on a wheel mounted on the vertical shaft of direction *t*, whose cog-wheel gears with *m*—see Fig. 6—for traversing. A collar, Fig. 5, intermediate between the two shafts and lowered on to the axis, can be engaged at will either with the rear or with the front shaft, by means of a lever L; in the first case it is arranged for elevation, in the second for direction. To lay it by hand, the gunner operates on the one hand with the lever L, on the other with the fly-wheel V on the axis. To lay the gun electrically a pawl is raised, which lowers the fly-wheel V, and the latter is drawn back in such a way as to uncouple it. The cog-wheel U, Fig. 5, is then engaged, mounted on the front extremity of the axis, with an auxiliary shaft *v* moved by the motor. The piece is then elevated and pointed by working on the engaging lever L with a commutator, which gives the desired sense of rotation to the shaft *v*. This commutator is provided with rheostats, which enable the swiftness of rotation to be varied.

Personnel necessary to the service of the guns.

For the working of the gun of 12 cm. four men are sufficient: a pointer who lays and fires the gun, a gunner who opens and closes the breech, a gunner who loads, and a gunner who removes the empty cartridge. In fact, the pointer can open and shut the breech when it is not necessary to alter the laying much; the number of the gunners is then reduced to three. For the gun of 15 cm. five men are necessary, for two gunners are required to carry the cartridge and load.

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The following enumeration of the features characterising Canet's system of quick-firing guns is an abbreviated translation from a description drawn up with his sanction. The advantages claimed are naturally based on opposite views to those referred to above in some particulars, as in the case of separation of projectile and charge in the higher calibres. **Features characteristic of Canet's system of quick-firing ordnance.**

The gun is remarkable for its simplicity of construction. The elements in building up the structure are long and of great thickness, of regular form, and consequently easy to temper well. The tube is stiff, resisting flexion. Solidity is given by the hooking or gripping of the elements on each other. Tangental and longitudinal resistance are equalised. The breech screw is made in the tube itself, which makes it possible to avoid joints between the tube and jacket at the seat of greatest strain. Besides, the tube is thus completely supported by the surrounding hoop, and better resists the strain to which it is subjected. **Construction.**

M. Canet aims especially at the attainment of high initial velocities. The new pieces give 800 m. (2625 ft.) for actual service. It is only thus that a trajectory of great tension (or flat trajectory) and sufficient accuracy is obtained, and that rapid fire attains its true efficiency. The tension of the trajectory increases the zone of danger for the enemy's ships, and thus greatly favours the chances of hitting. **Initial velocities.**

Twelve and 15-cm. guns have been subjected to trials for strength. They bore, without the least injurious strain, pressures of 3600 to 4000 atmospheres per square centimetre (23·60 to 26·25 tons per square in.), much greater pressures than would arise on service.

The breech is on a simple system, easy to examine and dismount, and only containing a limited number of pieces. It opens by a single movement of a lever, and not by successive movements, which are always bad for quick-fire. Even with two motions men working the gun have always a tendency to begin a movement before the preceding one is completed. Hence come troubles and delays. The springs and locks are quickly changed. The change of a lock and its spring is effected in a few seconds. **Breech.**

The great advantages of the screw over the wedge are (1) The piece is shortened at the breech end; (2) better distribution of strength; (3) better placing of the cartridge case, and more even and regular extraction; (4) easier working on account of less effort being necessary; (5) the descent of a wedge throws the cartridge case too violently to the rear; (6) the wedge sometimes cuts the envelope of the cartridge; (7) in the case of a hitch in opening there is a long lever to overcome the resistance; (8) the extraction is made gradually (progressivement) and completely; (9) the cartridge case **Advantages of screw over wedge.**

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moves out a little in rear of the breech, and is not projected violently, as in some wedge guns, so as to wound men in rear, and so injure the cases as to prevent repeated use; (10) change of extractors is easily made; (11) locking of the shutter is simple and demands no spring; (12) strong and simple ignition; (13) the breech is furnished with safety arrangements; (14) impossibility of firing unless the breech is completely closed; (15) prevention of unscrewing; (16) prevention of the breech opening prematurely; (17) special form of cartridge case, giving very good obturation and power of extraction.

Carriage. The carriage is so balanced as to work easily under all conditions, and all movements are effected by means of two hand-wheels placed at the side under the hand of the man who lays the gun. The brake cylinder is subjected only to regular pressure well controlled by means of the centre piston system. The recovery after recoil is very rapid. The sights are so fixed on the side of the carriage as to move in elevation and depression, but not to recoil with the piece. Consequently, the eye can be kept to the line of sight without interruption, which is indispensable for quick-fire. Provision is made for easily seeing that the recoil cylinders are full, and the springs for recovery regulated to the proper tension by means of a small pump fixed to the side of the carriage.

Efficient protection is provided by a shield to all the parts of the carriage. Accuracy and rapidity in laying has been shown by trials made by the Navy at fixed and moving targets. Reflecting and illuminated electric sights are provided for firing at night. The projectile and charge are united in one cartridge even in the large calibres, which give much more rapid fire than when separate. Electric firing can be employed by the introduction of a needle fitted in an ebonite ring. Special arrangements are provided to supply ammunition to the guns at the rate required for quick-fire, for which ordinary means are not sufficient.

Canet quick-firing guns for coast defence. Quick-firing guns perform very great service in coast defence. For this pieces of great range and flat trajectory are required, which, with the accuracy of fire due to a fixed platform, may stop hostile ships at a great distance before they can open an effective fire. Not being limited in the matter of weight, it is possible to have very long and powerful guns, which M. Canet mounts on carriages furnished with hydraulic breakes and recuperators. For the special case of guns mounted as bow-chasers, M. Canet has designed a carriage on the same principle, but pivoting in front. He has also made one of a simple pattern, which can be easily fixed by a strong bolt, or dismounted and brought into the interior of the ship.

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BRITISH RIFLED ORDNANCE.

(Chiefly founded on the official "List of Service Ordnance, 1891," brought out in the Autumn of 1891.)

Ordnance. Nature. Calibre or Pr.	Weight.	Mark and Service.*	Total length in inches.	Length of Bore, including Chamber.	Chamber. Diameter.	Length to base of projectile.	Capacity.	Rifling. Twist one turn in: Least at breech.	Greatest at muzzle.	Distance at muzzle twist is uniform.	System.†	Charge (full). Weight.‡	Projectile. Diameter.	Weight.§	Value of $\frac{d^2}{w}$.	Value of $\frac{w}{d^3}$.	Muzzle velocity.	Ballistics (with full charges). Total muzzle energy.	Muzzle energy per ton of gun.	Perforation of wrought iron. At muzzle.	At 1000 yards range.	At 2000 yards range.
				calbs.	ins.	ins.	cub. ins.	cals.	cals.	ins.		lbs.	ins.	lbs.			f. s.	ft. tons.	ft tons	ins.	ins.	ins.
B.L. Guns. 16·25-in.	110½ tons.	I.	524·0	30·0	21·125	84·5	28,660	130	30	77·2	P.E.O.C.	960 S.B.C.	16·25	1800	0·147	0·420	2087	54,390	492	34·2	32·0	30·1
13·5-in.	69 & 67 tons.	I. II. III. & IV.	433·0	30·0	18·0	66·5	17,100	120 or 60	30	166·7 or 0	P. Rifling increasing twist, in E.O.C. System from 0, Hook Section II. from 1 in 60; all others belong to Hook Section I.	630 S.B.C.	13·5	1250	0·146	0·508	2016	35,230	511 / 526	30·1	28·2	26·4
12-in.	45 & 46 tons.	III. IV. V. & V.$_W$	328·5	25·25	16·0	48·0	9,666	120	35	126·3		259 P.Br.	12·0	714	0·202	0·413	1914	18,130	403 / 394	22·6	20·6	18·8
10-in.	29 tons.	II. III. III.$_A$ & IV.	342·4	32·0	14·0	54·0	8,370	60	30	0		252 P.Br.	10·0	500	0·200	0·500	2040	14,430	498	22·3	20·4	18·6
9·2-in.	21 & 22 tons.	I. & II.	255·8	25·56	11·0	44·0	4,300	118·5	35	81·12		144 P.Br.	9·2	380	0·238	0·477	1809	8,622	411 / 392	17·9	16·1	14·6
9·2-in.	24 & 22 tons.	III. V. VI. VI.$_A$ & VII.	310·0	31·5	12·0	43·0	4,950	120	30	120·4		166 P.Br.	9·2	380	0·238	0·477	2036	10,920	455 / 496	20·3	18·3	16·6
8-in.	13 & 14 tons.	III.	226·3 / 222·5	25·6	10·5	34·5	3,050	120	35	67·7		100 P.Bl.	8·0	210	0·305	0·410	1953	5,554	427 / 397	15·4	13·4	11·7
8-in.	15 tons.	IV.	254·5	29·6	10·5	38	3,350	110	35	99·7		118 P.Br.	8·0	210	0·305	0·410	2150	6,730	449	17·1	14·9	12·9
8-in.	14 tons.	VI.						60	30	0							2200	7,060	508	17·4	15·2	13·2
6-in.	80 cwt.	(80 pr.)	165·6	26·0	7·5	27·4	1,155	0	40	7·02		34 S.P.	6·0	78·44	0·450	0·370	1880	1,961	490 / 484	10·5	8·4	6·8
6-in.	81 cwt.	..	162·6	25·5	7·5	28·05	1,185	0	40	4·02												
6-in.	81 cwt.	II.	165·5	26·0	8·0	26·75	1,364	106·5	35	65·13		36 E.X.E. 34 P$_2$.	6·0	100	0·360	0·463	1672	1,938	436	10·4	8·8	7·4
6-in.	89 cwt.	II.$_P$	153·5	24·0	8·0	26·75	1,364	106·5	35	65·13												
6 in.	89 cwt. 5 tons.	III. III.	170·7	25·53	8·0	26·75	1,364	120	35	58·9		48 E.X.E. 36 E.X.E. 42 P$_2$.	6·0				1960	2,665	599 / 533	12·4	10·5	8·9
6-in.	5 tons.	IV. VI.	173·5	26·0	8·0	26·75	1,364	120 / 60	35 / 30	61·75 / 0		48 E.X.E. 45 P.Bl. 42 P$_2$.	6·0									

The Roman numeral is the number of the pattern given.

* Further differences in pattern are indicated by letters A, B, and C.

† P. means Polygroove; Pl., Plain; W., Woolwich; F., French; F.M., French modified; H., Henry.

‡ S.B.C. (in column for charge) means Slow-burning Cocoa; P.Bl. stands for Prismatic Black; P.Br. for Prismatic Brown; Pb., Pebble; R.L.G., Rifle Large Grain; L.G., Large Grain; E.X.E., Experimental letter E.

§ For the higher natures the weight of projectile given is for Palliser shot; for the lower natures it is for filled common shell.

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BRITISH RIFLED ORDNANCE—*continued.*

(Chiefly founded on the official "List of Service Ordnance, 1891," brought out in the Autumn of 1891.)

Ordnance.													Charge. (full).	Projectile.					Ballistics (with full charges).				
Nature.					Chamber.			Rifling.													Perforation of wrought iron.		
	Calibre or Pr.	Weight.	Mark and Service.*	Total length in inches.	Length of Bore, including Chamber.	Diameter.	Length to base of projectile.	Capacity.	Twist one turn in: Least at breech.	Twist one turn in: Greatest at muzzle.	Twist one turn in: Distance at muzzle twist is uniform.	System.†	Weight.‡	Diameter.	Weight.§	Value of $\frac{d^2}{w}$.	Value of $\frac{w}{d^3}$.	Muzzle velocity.	Total muzzle energy.	Muzzle energy per ton of gun.	At muzzle.	At 1000 yards range.	At 2000 yards range.
					calbs.	ins.	ins.	cub. ins.	cals.	cals.	ins.		lbs.	ins.	lbs.			f. s.	ft. tons.	ft.tons.	ins.	ins.	ins.
B.L. Guns.	5-in.	38 cwt. 40 cwt.	I. I.p. II. III. IV. & V.	139·15	25·0	5·75	19·05	504	117 120	30 25	52·4 52·15 51·8	All Hook Section I. or II. P.	16 S. P.	5·0	50	0·500	0·400	1800	1,124	590 562	8·7	6·1	4·7
	4-in.	13 cwt.	..	66·0	14·81	4·5	8·13	126·5	116	35	11·39		$3\frac{5}{6}$ R.L.G.4 $3\frac{1}{4}$ R.L.G.2	4·0				1180	241	371	4·3	3·5	2·9
	4-in.	22 cwt.	I.	106·75	25·0	5·3	21·4	461	120	35	38·37		12 S.P.	4·0	25	0·640	0·391	1790	556	505	6·8	5·0	3·8
	4-in.	23 cwt. 26 cwt.	II. II.p. III. IV.V.& VI.	120·0	27·0	5·3	18·5	417	120	30	43·77			4·0				1900	625	544 481	7·2	5·4	4·0
	20-pr.	12 cwt.	I. (L.)	107·5	29·0	3·9	15·5	188	120	25	40·9		6 S.P.	..	17·25	0·599	0·491	1665	385	641	..	..	..
	12-pr.	7 cwt.	I. (L.)	92 35	28·0	3·63	11·0	117	120	28	35·8		4 S.P.	3·0	11·53	0·720	0·463	1720	249	740	..	..	..
M.L. Guns.	17·72-in.	100 tons.	I. L.	391·8	20·43	19·7	59·72	16,957	150	50	2·88	P.Pl.	450 Pr.1 or 2 Bl.	17·72	2000	0·157	0·359	1548	32,700	327	24·6	22·7	20·9
	16-in.	80 tons.	I.	321·0	18·0	18·0	59·6	14,600	0	50	0	P.Pl.	450 Pr.1 Br 200 E.X.E	16·0	1700	0·151	0·415	1540	27,960	350	24·3	22·5	20·9
	12·5-in.	38 tons.	II.	222·8	15·84	14·0	41·125	6,000	438	35	0	W.	210 Pr.2 or Pr.1 black 190	12·5	818·0	0·191	0·419	1575	14,070	371	19·3	17·5	15·9
	12-in.	35 tons.	I.	195·0	13·54	Unchambered.			0	35	0	W.	140 Pb.2	12·0	714·0	0·202	0·413	1390	9,566	273	15·9	14·5	13·2
	12-in.	25 tons.	II.	182·5	12·09	,,			100	50	0	W.	85 Pb.2	12·0	614·0	0·235	0·355	1292	7,190	288	13·4	12·1	11·0
	11-in.	25 tons.	II.	180·0	13·18	,,			0	35	0	W.	85 Pb.	11·0	548·0	0·221	0·411	1360	7,028	281	14·2	12 9	11·7
	10-in.	18 tons.	II.	180·0	14·55	,,			100	40	0	W.	70 Pb.	10·0	410·0	0·244	0·410	1379	5,408	300	13·1	11·7	10·5
	9-in.	12 tons.	V.	156·0	13·89	Unchambered.			0	45	0	W.	50 Pb.	9·0	256·0	0·316	0·351	1440	3,681	307	11·4	9·8	8·5
	9-in. ‖	12 tons.	VI.	156·0	13·89	,,			100	35	22·5	P.	..	9·0	360·0	..	..	..	..	..	..	..	..
	8-in.	9 tons.	III.	144·0	14·75	,,			0	40	0	W.	35 Pb.	7·92	179·0	0·358	0·350	1390	2,398	266	9·7	8·2	7·1
	7-in.	90 cwt.	I.	131·0	15·86	,,			35	35	All	W.	22 Pb.	6·92				1325	1,395	310	7·9	6·5	5·7
	7-in.	$6\frac{1}{2}$ tons.	III.	133·0	15·86	,,			35	35	All	W.	30 Pb.	6·92	114·6	0·428	0·334	1525	1,848	284	9·2	7·2	5·9
	7-in.	7 tons.	IV. L.	148·0	18·0	,,			35	35	All	W.	30 Pb.	6·92				1561	1,936	277	9·4	7·7	6·4
	64-pr.	64 cwt.	III.	118·0	15·47	,,			40	40	All	Pl.	10 R.L.G.4	6·28	64·5	0·588	0·271	1390	865	270	..	..	..

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M.L. Guns.	64-pr.	71 cwt.	I.	122·2	16·42	Unchambered.			40	40	All	Pl.	..	6·29	64·5	0·588	0·271	1260	715	201	..	..	..
	40-pr.	35 cwt.	II. L.	120·0	22·0	"			35	35	All	W.	6¾ R.L.G.[4]	4·75	38·8	0·582	0·362	1425	546	312	..	..	..
	25-pr.	18 cwt.	I. L.	98·0	22·0	"			35	35	All	W.	4½ R.L.G.[4]	3·94	24·96	0·622	0·408	1350	315	350	..	..	..
	16-pr.	12 cwt.	I. L.	78·0	19·0	"			30	30	All	F.M.	3 3/16 R.L.G.[2]	3·54	16·1	0·771	0·366	1355	205	342	..	..	..
	15-pr.	422 lbs.	I. L.¶	70·5	20·0	3·2 (decreased)			60	20	15·63	..	..	3·3	14·25	..	..	1040	113	600	..	..	..
	13-pr.	8 cwt.	I. L.	92·0	28·0	3·15	14·13	110·4	100	30	9·0	P.	3¼ R.L.G.[4]	3·0	13·0	0·689	0·484	1595	232	580	..	..	..
	9-pr.	8 cwt.	I. & II.	72·0	21·17	Unchambered.			30	30	All	F.M.	1¾ R.L.G.[2]	3·0 / 3·0	9·1	0·996	0·335	1330 / 1250	119 / 97	298 / 323	..	..	..
	9-pr.	6 cwt.	I.	61·0	17·67	"			30	30	All	F.M.											
	9-pr.	6 cwt.	II. III. IV.	74·5 / 74·875	22·0	"			30	30	All	F.M.	1¾ R.L.G.[2] and 1½ R.L.G.[2]	2·94	9·1	0·956	0·356	1390	119	397	..	..	..
	2·5-in.	400 lbs.	I. L.	70·45	26·6	2·56	11·07	54	80	30	3·53	P.	1½ R.L.G.[2]	2·5	7·25	0·862	0·464	1440	101	377	..	..	..
	7-pr.	200 lbs.	IV.	41·0	12·0	Unchambered.			20	20	All	F.	¾ R.F.G.	2·94	7·29	1·185	0·287	950	46	515	..	..	..
R.B.L. guns (screw).	7-in.	82 cwt.	..	120·0	14·21	7·2	16·0	620·0	37	37	All	P.	11 R.L.G.[2]	7·0	108·31	0·453	0·315	1100	909	222	..	..	..
	40-pr.	35&32cwt.	..	121·0 & 120	22·39	4·96	13·5	257·8	36½	36½	All	P.	5 R.L.G.[2]	4·75	40·7	0·554	0·380	1160	380	217	..	..	..
	20-pr.	15&13cwt.	..	66·125	14·43	3·94	11·0	131·0	38	38	All	P.	2½ R.L.G.[2]	3·75	21·8	0·645	0·414	1100	183	244	..	..	..
	12-pr.	8 cwt.	..	72·0	20·458	3·2	8·5	66·0	38	38	All	P.	1½ R.L.G.[2]	3·0	11·25	0·800	0·417	1239	200	299	..	..	..
	9-pr.	6 cwt.	..	62·0	17·5	3·2	7·0	55·1	38	38	All	P.	1 1/16 R.L.G.[2]	3·0	8.56	1·052	0·317	1055	66	220	..	..	..
	6-pr.	3 cwt.	..	60·125	21·2	2·625	7·0	37·9	30	30	All	P.	¾ R.L.G.[2]	2·5	5·46	1·145	0·350	1046	41	273			
Quick-firing Guns.													lbs. oz.								Mild steel plate.		
Hotchkiss	6-pr.	8 cwt.	I. & II.	97·63	89·76	..	..	..	180	29·9	9·98	P.Pl.	1 15 Q.F.	2·24	6·0	0·836	0·534	1818	137·5	344·8	3·7	2·4	..
Nordenfelt	6-pr.	6 cwt.	I.	104·4	95	..	..	..	180	29·9	9·98		1 15 Q.F.	2·24	6·0	0·836	0·534	1837	140·4	468·0	3·7	2·5	..
Hotchkiss	3-pr.	5 cwt.	I.	80·63	74·06	..	..	..	25	25	All		1 8 Q.F.	1·85	3·3	1·037	0·521	1873	80·3	321·2	3·1	1·9	..
Ordnance Q.F.	4·7 in.	41 cwt.	I. & II.	194·1	189	..	..	..	100	34·4	6·65	E.O.C.	12 0 S.P.	4·72	45·0	0·495	0·428	1786	995·4	485·5	6·9	5·4	..
Machine Guns.													grains.		oz. grs.								
Nordenfelt, 2 bar.	1-in.	180 lbs.	I.	52·75		..	..	..	35	35	All	H.	625 M.G.	1·0	7¼ 0	2·207	0·453	..	..	..	¼-in. at 200 yards.		
" 4 bar	1-in.	447 lbs.	III.**	57·0		..	..	..	35	35	All	H.											
" 5 bar	0·45-in.	143 lbs.	II. G. G.	42·25		..	..	..	22	22	All	H.	85 R.F.G.[2]	0·450	480	2·952	0·751	..	..	..	Same as MH.Rifle, which perforates ½ in. wrought iron plate at 600 yds., 5/16 in. at 400 yds., ¼ in. at 100 yds.		
Gardner, 1 bar	0·45-in.	76 lbs.	G. G.	47·0		..	..	..	22	22	All	H.											
" 2 bar	0·45-in.	218 lbs.	..	47·0		..	..	..	22	22	All	H.											
" 5 bar	0·45 in.	290 lbs.	I. G. G.	53·5		..	..	..	22	22	All	H.											
Gatling, 10 bar	0·65 in.	817 lbs.	..	66·5		..	..	..	30	30	All	H.	270 R.F.G.[2]	0·65	1422	2·109	0·730	..	..	..	Not known.		
" 10 bar	0·45-in.	444 lbs.	G. G.	59·41		..	..	..	22	22	All	H.	85 R.F.G.[2]	0·450	480	2·952	0·751	..	..	..	Same as MH.Rifle		
" (Acclesfeed)		266 lbs.	G. G.	51·0		..	..	..	22	22	All	H.											
Maxim, 1 bar	0·45 in.	63 lbs.	G. G.	43·6		..	..	..	22	22	All	H.											

L., Land-service only, but might concern navy when serving on land. The Roman numeral is the number of the pattern given.

* Further differences in pattern indicated by letters A, B, and C. † P. means Polygroove; Pl., Plain; W., Woolwich; F., French; F.M., French modified; H., Henry. ‡ S.B.C. (in column for charge) means Slow-burning Cocoa; P.Bl. stands for Prismatic Black; P.Br. for Prismatic Brown; Pb., Pebble; R.L.G., Rifle Large Grain; L.G., Large Grain; E.X.E., Experimental letter E. ◊ For the higher natures the weight of projectile given is for Palliser shot; for the lower natures it is for filled common shell. ‖ For high-angle fire. ¶ Mountain-service jointed gun.

** I. and II. differ chiefly in being 7 lbs. lighter; I. has a pitch of rifling of 1 in 60 in.; G.G., Gardner Gatling; H., Henry

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AUSTRIAN NAVAL ORDNANCE.

	Krupp Steel B.L. Guns.													Uchatius. St., Br.					Cast Iron BL.
Designation by Calibre, in centimètres	30·5	28 L. 22	26 L. 22	·24 L. 35 C. 86	24 L. 35 C. 86	24 L. 22	21 L. 20	15 L. 35 C. 86	15 L. 35 C. 80	15 L. 26	15 L. 26	12 L. 35 C. 80	12 L. 35 C. 87	15 L. 25	15 L. 37	12 L. 35	9 L. 24	7 L. 15	15 L. 21
Calibre, in inches	12·01	11·02	10·24	9·45	9·27	9·27	8·24	5·87	5·87	5·87	5·87	4·72	4·72	5·87	4·72	4·72	3·43	2·60	5·87
Length: Total, Feet	35·11	20·01	18·77	27·60	17·16	15·45	13·73	17·13	17·13	12·63	12·63	13·8	13·8	12·19	14·38	13·97	6·76	3·28	10·13
Length: Rifled Portion, in inches	314·8	169·8	148·4	233·2	135·9	115·3	105·0	151·4	149·6	105·7	111·6	128·5	126·3	111·4	123·2	123·8	57·5	23·8	89·8
Length: Powder Chamber ,,	69·9	37·4	46·1	69·3	41·7	41·7	37·0	37·8	35·4	29·3	23·4	24·0	26·3	23·6	36·6	31·65	16·5	11·0	18·0
Length: Of bore in calibres	35	18·8	19·0	35	19·2	16·9	17·2	35	31·5	23·0	23·0	32·3	32·3	23·0	37	32·9	21·6	13·4	18·4
No. of Grooves	68	64	32	25	32	32	30	36	36	24	36	32	32	36	32	32	24	18	30
Twist in calibres	..	45	70	26·9	70	64·7	59	45—25	25	68·4	45	25	25	45	45—25	25	45	30	63·2
Weight: Gun, tons	47·8	27·1	21·7	26·5	14·6	14·5	8·68	5·7	4·69	3·94	3·94	2·25	2·46	3·35	3·2	2·85	0·479	0·09	2·81
Weight: Breech Block, in lbs.	..	2315	1951	..	1411	1422	1080	445·3	..	321·9	321·9	..	..	209·4	..	211·6	55·1	18·7	176·4
Weight: Steel Shell ,,	1003·1	557·8	395·7	474·0	292·1	292·1	206·6	112·5	86·0	72·8	84·9	57·3	57·3	84·9	57·3	57·3	..	..	..
Weight: Chilled Shell ,,	..	..	..	..	..	308·6	196·2	..	..	..	..	..	..	..	..	..	..	..	..
Weight: Common Shell ,,	1003·1	488·3	354·2	474·0	263·5	263·5	172·0	112·5	69·9	67·2 / 65·5	69·4	57·3	57·3	69·45	57·3	57·3	14·02 / 14·22	6·42	6·11
Weight: Shrapnel Shell ,,	..	..	..	..	..	..	..	112·5	71·9	67·2 / 65·5	69·4	57·3	57·3	69·45	57·3	57·3	15·76	6·88	6·79
Weight of Bursting Charge: Case Shot ,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16·53	6·94	38·4
Weight of Bursting Charge: Steel Shell ,,	10·6	14·3	8·8	5·1	6·6	6·6	4·4	1·3	1·76	1·65	2·09	0·55	0·55	2·09	0·53	0·55	..	..	..
Weight of Bursting Charge: Chilled Shell ,,	..	..	..	..	..	3·75	..	..	..	..	..	..	..	..	..	..	..	..	..
Weight of Bursting Charge: Common Shell ,,	35·7	18·7	20·3	17·9	15·0	15·0	15·0	5·29	3·86	3·86	5·07	2 2	2·2	5·07	2·20	2·21	0·46	0·18	1·87
Weight of Bursting Charge: Shrapnel Shell † in lbs.	..	..	..	..	..	..	..	1·26	1·10	1·08	1·08	0·57	0·57	1·08	0·57	0·57	0·20	0·09	0·90
Weight of Firing Charge: Steel and Chilled Projectile, in lbs.	308·6	123·5*	89·3 B	..	76·1 B	52·9	50·7 C	49·6	38·8	21·6 C	20·9 C	19·8 B	..	20·9 C	30·0 B	19·8 B	..	.	..
Weight of Firing Charge: Common Shell, in lbs.	308·6	123·5*	59·5	..	44·1	44·1	30·9	49·6	38·8	14·3 / 21·6	20·9 C	19·8 B	..	20·9 C	30·0 B	19·8 B	3·31 / 0·97	0·77 O / 0·35	4·74
Weight of Firing Charge: Exercising, in lbs.	154·3	68·3	59·5	..	44·1	44·1	30·9	28·7	19·6	21·6 C	20·9 C	11·0	..	20·9 C	19·8 B	12·13 B	3·31	0·77 O / 0·35	4·74
Weight of Firing Charge: Saluting ,,	19·8	19·8 O	19·8 O	..	15·4 O	15·4 O	8·82 O	4·74	4·74 O	4·74 O	4·74 O	2·4	2·4	4·74 O	2·4	2·4	0·88 O	0·35	4·74
Muzzle Velocity, in feet	1755·3	1568	1575	..	1421	1378 / 1345	1519	1883	1969	1641	1562	1738	..	1562	1942·3	1755	1470	978	1017
Muzzle Energy: Total, foot-tons	21,420	9513	6808	..	4087	3847	3306	2767	2312	1358	1435	1201	..	1435	1499	1224	..	..	..
Muzzle Energy: Per inch circumference, foot-tons	567·8	270·4	211·6	..	140·4	132·1	127·7	149·0	125·4	73·7	77·9	81·0	..	77·9	101·1	82·45	..	..	..
Thickness of Iron, perforated inches at Muzzle	24·8	17·0	15·0	..	12·1	11·7	11·6	12·8	11·7	8·8	9·1	9·4	..	9·1	10·54	9·45	..	..	..

NOTE.—P stands for pebble powder; C for cube powder; * prismatic powder; O ordinary powder (inferior); B brown prismatic, † Generally steel.

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DANISH NAVAL ORDNANCE.

	Krupp B.L. Guns designated.											Armstrong M.L.					Finspong.
Designation by Calibre	35·5 cm.	30·5 cm.	26 cm. long.	26 cm. short.	21 cm.	15 cm. long.	15 cm. medium.	15 cm. short.	12 cm. long.	12 cm. short.	8·6 cm.	10 in.	10 in.	10 in.	9 in.	8 in.†	6 in.
Calibre, in inches	13·98	12·01	10·24	10·24	8·24	5·91	5·91	5·91	4·72	4·72	8·43	10·0	10 in.	10 in.	9·0	8·0	6·04
Total length, in feet	29·1	22·0	32·8	18·77	24·04	17·1	12·63	10·7	11·8	9·6	6·9	17·0	14·5	14·0	13·0	10·8	9·5
Length of Bore, including Powder Chamber — in inches	304·7	227·2	327·6	194·5	264·5	190·3	135·0	112·9	128·8	102·4	73·6	175·5	145·5	140·0	125·0	104·2	100·8
Length of Bore, including Powder Chamber — in calibres	21·8	18·9	32·0	19·0	35	32·2	22·8	19·1	27·3	21·7	21·3	17·5	14·55	14·0	13·3	13·1	16·7
Number of Grooves	80	68	60	60	48	36	36	36	32	32	24	7	7	7	6	6	6
Twist of Rifling, in calibres	45	45	70–25	45	70–25	70–25	45	45	25	40	45	40	40	40	40	50	40
Total weight, including Breech-gear, tons	51·3	35·4	27·6	21·6	13·3	4·7	4·4	3·5	2·13	1·39	0·49	20·0	18·5	18·0	12·5	8·65	2·46
Weight of — Breech Block, lbs.	4695·8	2910	2006	1940	903·9	390·2	330·7	324·1	229·2	176·4	101·4	..	..	..	..	..	..
Weight of — Steel Shell, „	1157·4	725·3	451·9	451·9	238·1	112·4	..	86·0	..	44·1	..	400	400	400	..	..	..
Weight of — Chilled Shell, „	1157·4	725·3	..	451·9	..	..	86·0	86·0	..	44·1	..	400	400	400	250·2	165·3	..
Weight of — Common Shell, „	1157·4	725·3	451·9	451·9	238·1	112·4	69·4	69·4	57·3	36·2	15·2	400	400	400	250·2	131·2	55·1
Weight of — Shrapnel Shell, „	1157·4	725·3	451·9	451·9	238·1	112·4	86·0	86·0	57·3	44·1	..	..	..	..	..	..	15·4
Weight of — Case Shot, „	..	..	..	..	..	..	..	..	..	..	..	191·8	..	..	154·3	127·9	58·4
Weight of Bursting Charge — Common Shell, „	57·3	39·7	25·4	25·4	12·8	6·2	3·0	3·0	1·7	1·4	0·44	26·5	26·5	26·5	18·5	7·5	.. 5·0
Weight of Firing Charge — Steel or Chilled Shell, lbs.	330·7	180·2	191·8	101·4	105·8	41·9	19·3	21·8	17·4	8·8	..	71·7	71·7	71·7	44·1	29·8	..
Weight of Firing Charge — Common Shell, „	330·7	180·2	191·8	112·4	105·8	41·9	19·3	21·8	17·4	8·8	3·3	71·7	71·7	71·7	44·1	19·8	60·6
Muzzle Velocity — Armour-piercing Projectile, feet	1762	1675	2018	1640	2021	1800	1565	1542	..	1416	..	1457	1368	1368	1368	1378	..
Muzzle Velocity — Common Shell, „	1762	1675	2018	1640	2021	1890	1683	1690	1720	1549	1457	1457	1368	1368	1368	1320	1076
Muzzle Energy — Total foot-tons	24910	14110	12770	8428	6745	2784	1461	1418	..	6130	..	5889	5192	5192	3246	2177	..
Muzzle Energy — Per inch circumference, foot tons	568·3	374·1	396·8	262·0	260·6	150·0	78·7	73·0	..	32·8	..	189·0	165·3	165·3	115·8	86·9	..
Perforation at Muzzle, in inches	24·8	20·0	23·4	16·7	16·9	12·8	9·1	8·8	..	5·8	..	14·1	13·1	13·1	10·9	9·5	..

NOTE.—Chilled projectiles will gradually be replaced by steel.

† There is another Armstrong gun differing very little from this one.

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DUTCH NAVAL ORDNANCE.

	Krupp Breech Loading.							Armstrong Muzzle Loading.			Dutch Breech Loading.			
Designation by Calibre, in centimètres	28	21	17	15 No. 1.	15 No. 2.	12 No. 1.	12	28	23	18	12 No. 2.	12 No. 3.	12*l*	7·5
Calibre, in inches	11·02	7·91	6·80	5·87	5 87	4·72	4·72	11·00	9·00	7·00	4·72	4·72	4·72	2·95
Total Length, in feet	20·01	24·04	13·94	12·63	17·13	6·89	13·78	14·42	13·00	11·00	6·89	6·89	13·78	7·87
Length of Rifled Portion of bore, in inches	170·8	222·2	112·7	111·8	151·4	61·4	128·5	119·0	104·0	95·5	61·4	61·4	..	43·2
Length of Powder Chamber "	36·4	42·4	36·0	23·2	37·7	13·0	24·0	26·0	21·9	15·5	13·0	13·0	..	6·7
Length of bore, in Calibres	18·8	35	21·9	23·0	35	15·8	35	12·1	14·0	15·9	15·8	15·8	35	17·5
Number of Grooves	64	$\frac{48}{64}$	42	36	44	12	32	9	6	3	12		32	20
Depth of Grooves, inches	0·069	0·059	0·118	0·118	..	0·049	..	0·20	0·18	0·18	0·118		0·06	0·049
Twist of Rifling in Calibres	45	∝ 25	45	40	25	40	25	∝ 45	∝ 45	35	40	40	∝ 45	∝ 30
Total Weight, in tons	27·21	$\frac{12·79}{13·98}$	5·51	3·94	4·72	0·79	2·26	24·46	12·50	7·17	0·93	0·90	2·31	0·21
Firing Charge: Armour Piercing Projectile, in lbs.	121·3	99·2	27·6	20·9	49·6	..	19·8	86·0	50·7	30·0			19·5	..
Firing Charge: Common Shell "	121·3	99·2	27·6	20·9	49·6	2·43	19·8	86·0	50·7	13·9	2·43		19·8	0·82
Weight: Armour-piercing Projectile "	560·0	308·6	132·3	86·0	112·2	41·0	57·3	533·5	249·1	114·6	..		57·3	..
Weight: Common Shell "	476·2	308·6	112·4	69·4	112·2	29·5	57·3	535·7	262·4	116·8	29·5		57·3	9·5
Weight: Case Shot "	273·4	..	63·9	41·9	..	26·5	57·3	185·2	149·9	68·3	26·5		..	9·3
Bursting Charge: Armour-piercing Projectile "	6·6	4·6	2·2	1·1	..	0·44	..	4·4	2·2	2·2	..		..	..
Bursting Charge: Common Shell "	26·5	12·3	6·6	6·6	..	2·0	..	28·7	17·6	8·8	1·8		..	0·44
Muzzle Velocity, feet	1558	1739	1558	1558	2001	971	1755	1332	1476	1558	951		1804	958
Muzzle Energy: Total, in foot-tons	9423	6471	2226	1447	3115	..	1224	6563	3763	1929	..		1264	..
Muzzle Energy: Per inch Circumference, foot-tons	272	260·7	104	84	169·0	..	82·5	191	134	89	..		85·2	..
Perforation at Muzzle, in inches	17·0	16·8	10·5	9·1	13·6	..	9·4	14·0	11·9	9·7	..		9·6	..
Metal employed or system of construction	Steel Jacket and Hoops.		Steel-hooped.		Steel Jacket and Hoops.	Steel-hooped.	Steel Jacket and Hoops.	Steel Tube and Wrought Iron.			Bronze.			

NOTE.—The 23-cm. guns also discharge 113-Kg. steel shells and 113-Kg. solid shot. The 18-cm. guns discharge steel shells of 51-Kg. and segment shells of 53-Kg. The 7·5-cm. guns discharge ring-shells of 4·3 Kg. Of the older guns there are yet extant three sorts—rifled 16-cm. muzzle-loader (mostly bronze), rifled bronze 7-cm. and 5-cm.

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FRENCH NAVAL ORDNANCE.

Date and Pattern of Gun.	1870–81.	70–81. 70–84.	81–84.	1884.				1881.									
Desig. by Calibre, in cms.	27	32	14	34	27	24	16	34 long.	34 short.	27	24	16 heavy.	16 light.	14	10	mm. 90	mm. 65
Calibre, in inches	10·80	12·6	5·46	13·39	10·80	9·45	6·49	13·39	13·39	10·8	9·45	6·49	6·49	5·46	3·94	3·54	2·57
Total length, in feet	23·97	27·93	13·64	..	28·47	24·89	17·04	33·69	25·32	27·12	23·70	15·14	15·14	14·3	8·6	7·1	3·58
Length of Bore, in inches	269·0	313·8	..	..	..	..	..	380·6	280·2	306 9	269·3	180·9	180·9	162·6	102·6	77·9	41·2
Length of Bore, in calibres	24·9	24·9	..	30	30	30	30	28·4	21·0	28·5	28·5	28·5	28·5	30	26	22	16
Number of Grooves	..	..	..	..	..	..	..	..	..	..	..	50	50	42	30	28	20
Depth of Grooves, inches	0·059	0·059	..	..	..	..	..	0·067	0·067	0·059	0·055	0·039	0·039	0·035	0·028	0·024	0·020
Rifling Twist	70	70	..	..	..	..	..	70	70	70	70	7°	7°	7°	7°	7°	8°
Total weight, in tons	24·6	41·3	32·0	51·18	27·6	17·91	49·2	52·2	47·2	27·4	17·7	4·9	3·9	3·2	1·18	0·54	0·09
Weight of Firing Charge: Armour Piercing Projectile lbs.	154·3	282·2 / 249·1	27·1	..	203·9	..	42·5	..	368·2	203·9	149·9	42·5	32·6	..	..	..	..
Weight of Firing Charge: Common Shell "	154·3	282·2 / 249·1	27·1	..	203·9	..	42·5	..	368·2	203·9	149·9	42·5	32·6	27·1	9·9	3·6	0·95
Weight: Armour Piercing Projectile* lbs.	476·2	760·6	66·14	925·9	476·2	317·5	99·2	925·9	925·9	476·2	317·5	99·2	99·2	..	..	..	..
Weight: Common Shell "	396·8	639·5	66·14	771·6	396·8	264·6	99·2	771·6	771·6	396·8	264·6	99·2	99·2	66·1	30·9	17·6	5·95
Weight: Case Shot "	..	..	..	..	..	..	..	..	..	..	..	..	..	61·7	39·0	19·5	7·7
Muzzle Velocity, in ft.-sec.	1887	1985 / 1804	1936	2133	2067	2067	1969	2001	1804	2034	2034	1969	1821	1936	1673	1493	1135
Muzzle Energy: Total, in foot-tons	11760	20780 / 17160	1719	29180	14110	9410	2668	26440	20880	13660	9107	2668	2080	..	..	..	..
Muzzle Energy: Per in. circ., foot-tons	346·6	525·0 / 433·5	100·2	693·7	397·3	317·1	130·8	628·8	496·6	402·6	308·4	130·9	121·3	..	..	..	..
Perforation at Muzzle, inches	19·5	24·0 / 21·7	10·5	27·6	20·9	18·7	12·0	26·3	23·2	21·4	18·4	12·0	11·5	..	..	..	..

NOTE.—Q.F. guns are now ordered to be made for several vessels. See pp. 311–313.

* Steel or chilled iron.

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FRENCH NAVAL ORDNANCE—*continued.*

Date and Pattern of Gun.	75–79.	Jacketed. 1870.			Jacketed. 70–75	Jacketed. 75	1875.					1870.					
Desig. by Calibre, in cms.	37	32	27	14	27 No. 1	10	42†	34	27 No. 1	27 No. 2	10	32 long.	27	24	19 long.	16	14
Calibre, in inches	14·57	12·6	10·79	5·46	10·8	3 94	16·54	13·39	10·8	10·8	3·91	12·6	10·8	9·45	7·64	6·49	5·46
Total length, in feet	36·7	22·0	17·7	10·3	19·3	9·3	32·5	22	19·3	19·3	9·3	22·0	17·7	16·21	13·6	12·2	10·3
Length of Bore, in inches	414·0	243·6	194·3	115·0	213·4	104·3	366·0	241·5	213·4	214·8	104·3	243·6	194·3	179·1	151·0	137·3	115·0
Length of Bore, in calibres	28·4	19·5	18	21·1	19·8	26·5	22·1‡	18	19·8	19·9	26·5	19·5	18·0	18·1	19·8	21·2	21·1
Number of Grooves	..	64	54	28	54	20	84	68	54	42	20	64	54	48	28	50	28
Depth of Grooves, inches	0·079	0·059	0·059	0·047	0·059	0·032	0·079	0·059	0·059	0·059	0·032	0·059	0·059	0·059	0·059	0·039	0·047
Rifling Twist	7°	4°	4°	4°	4°	7°	7°	4°	4°	4°	7°	4°	4°	4°	4°	7°	4°
Total weight, in tons	75·1	38·8	22·8	2·6	27·9	1·18	74·8	47·6	27·6	24·4	1·18	38·4	22·8	15·4	7·9	4·92	2·66
Weight of Firing Charge — Armour Piercing Projectile * lbs.	463	189·6	136·7	..	165·3	..	604·1	257·9	136·7	103·6	..	151·0	92·6	62·8	33·1	39·7	..
Weight of Firing Charge — Common Shell „	463	196·2	126·8	13·6	145·5	10·1	..	231·5	121·3	103·6	7·1	151·0	92·6	62·8	33·1	39·7	9·0
Weight — Armour Piercing Projectile lbs.	1235	760·6	476·2	..	476·2	..	1719·6	925·9	476·2	476·2	..	760·6	476·2	317·5	165·3	99·2	..
Weight — Common Shell „	1014	631·6	396·8	61·7	396·8	30·9	1433·0	771·6	396·8	396·8	26·3	631·6	396·8	264·6	137·8	99·2	46·3
Weight — Case Shot „	..	..	321·9	42·8	321·9	18·7	..	..	321·9	321·9	18·7	..	321·9	211·6	..	68·3	39·7
Muzzle Velocity, in ft.-sec.	1969	1543	1575	1529	1736	1673	1739	1595	1641	1542	1591	1437	1424	1444	1470	1782	1493
Muzzle Energy — Total, in foot-tons	33210	12590	8193	..	9942	..	36040	16320	8865	7852	..	10880	6695	4592	2477	2183	..
Muzzle Energy — Per in. circ., foot-tons	725·4	318	242	..	293	..	695·5	388	261	231·5	..	275	197·3	154·7	103·2	107	..
Perforation at Muzzle, inches	28·2	18·3	16·0	..	17·8	..	27·4	20·3	16·7	15·6	..	16·9	20·53	20·3	10·4	10·8	..

* Steel or chilled iron. † There is also a 42-cm. gun of 20·35 calibres length, in 2 pieces. ‡ Chilled or steel.

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GERMAN NAVAL ORDNANCE.

	Krupp Steel Breech-loading Guns, designated by calibre.																							Bronze B.L.
Designation in centimètres	30·5 jack'd.	26 long.	26 jack'd.	26 short.	24 long.	24 short.	21 long.	21 long.	21 short.	21 short.	17 long.	17 short.	15 long.	15 short jack'd.	15 short.	15 short.	15 short jack'd.	15 short jack'd.	12·5 hoop'd.	12 hoop'd.	10·5 long.	8·7	8	8	8
Calibre, in inches	12·01	10·33	10·33	10·33	9·45	9·37	8·24	8·24	8·24	8·24	6·80	6·80	5·87	5·87	5·87	5·87	5·87	5·87	4·92	4·74	3·96	3·43	3·09	3·09	3·19
Length: Total, in feet	21·98	18·77	18·77	17·06	23·63	15·45	24·0	20·61	15·45	12·88	13·94	11·32	14·67	10·73	10·73	10·73	10·68	10·68	9·60	9·6	12·08	6·89	6·89	6·89	5·15
Length: Rifled portion, in ins.	181·9	149·8	150·0	129·3	201·6	116·2	218·2	176·5	124·6	114·9	117·1	102·2	128·5	93·3	87·1	86·7	87·1	86·7	85·7	85·3	113·6	62·7	57·6	57·6	45·9
Length: Powder Chamber†,,	45·3	44·7	44·4	44·7	53·5	40·9	75·3	46·7	37·1	34·0	31·5	16·7	31·1	19·0	25·1	25·5	25·1	25·5	16·7	16·7	19·5	10·7	10·5	10·5	9·73
Length: Bore, in calibres	18·9	18·8	18·8	16·8	26·1	16·8	35·6	27·1	19·6	18·1	21·9	17·5	27·2	19·1	19·1	19·1	19·1	19·1	20·8	21·6	33·6	21·4	22·0	22·0	17·4
Number of Grooves	72	36	48	36	56	48	48	48	30	30	30	30	36	36	36	24	36	24	32	18	32	24	12	12	12
Depth of Grooves, in inches	0·079	0·077	0·079	0·077	0·059	0·061	0·059	0·059	0·102	0·102	0·063	0·063	0·059	0·061	0·061	0·061	0·061	0·061	0·059	0·051	0·049	0·049	0·049	0·049	0·051
Twist, in calibres	45	50	50	50	25*	45	25*	25*	68	59	45	45*	25*	45	45	68	50	65	40*	60	25*	40*	46	46	46
Weight: Gun, including Breech Gear, tons	35·4	21·7	18·7	17·7	18·7	14·6	13·03	12·3	9·84	8·86	5·51	3·40	4·04	3·44	3·44	3·44	3·15	3·15	1·38	1·35	1·15	0·44	0·32	0·29	0·23
Weight: Breech Block, in lbs.	2954	2050	1973	1973	..	1378	831·1	908·3	831·1	831·1	496·0	414·5	390·2	324·1	324·1	324·1	324·1	381·4	163·1	163·1	149·9	86·0	63·9	63·9	55·1
Weight: Armour-piercing projectile,‡ in lbs.	725·3	412·3	412·3	412·3	474·0	306·4	308·6	308·6	217·2	217·2	117·9	117·9	112·4	76·1	76·1	76·1	76·1	78·3	..	..	..	..	..	..	..
Weight: Common Shell, in lbs.	725·3	357·1	357·1	357·1	474·0	261·5	308·6	308·6	174·2	174·2	112·9	112·9	112·4	65·0	65·0	65·0	65·0	61·1	40·1	33·1	39·7	14·9	9·4	9·4	8·3
Weight of Bursting Charge: Armour-piercing Shell, in lbs.	7·7	5·3	5·3	5·3	6·6	3·2	5·5	5·5	2·8	2·8	1·3	1·3	1·5	0·8	0·8	0·8	0·8	..	..	..	..	..	..	..	..
Weight of Bursting Charge: Common Shell, in lbs.	19·8	14·3	14·3	22·0	15·4	15·4	12·1	12·1	6·6	6·6	5·1	5·1	4·3	4·2	4·2	4·2	4·2	..	2·4	2·5	0·9	0·4	0·4	0·6	0·6
Weight of Firing Charge: Armour-piercing Shell, in lbs.	202·8	105·8	105·8	125·7	152·1	67·2	103·6	103·6	41·9	35·3	30·9	16·5	33·1	14·3	17·1	13·2	17·1	13·2	..	..	..	..	..	..	..
Weight of Firing Charge: Common Shell, in lbs.	202·8	105·8	105·8	125·7	152.1	50·7	103·6	103·6	41·9	35·3	30·9	16·5	33·1	14·3	17·1	12·1	17·1	12·1	8·8	4·6	8·8	3·3	1·1	1·1	0·9
Initial Velocity: Armour-piercing projectile, ft.-sec.	1718	1588	1588	1578	1657	1493	1739	1657	1463	1316	1608	1326	1624	1463	1463	1358	1463	1358	..	...	..	..	..	..	..
Initial Velocity: Common shell, ft.-sec.	1713	1641	1641	1654	1657	1391	1739	1657	1394	1276	1654	1342	1624	1555	1555	1447	1555	1447	1545	1280	1526	1545	1148	1119	1053
Muzzle Energy: Total, foot-tons	14,740	7211	7211	7119	9024	4736	6471	5876	3225	2606	2112	1436	2055	1131	1131	974	1131	1002	..	..	..	..	..	..	..
Muzzle Energy: Per in. circ., ft.-tons	391	223	223	220	304	161	250·0	227	125	101	98·9	67·3	111·5	61·3	61·3	52·8	61·3	54·3	..	..	..	..	..	..	..
Perforation at Muzzle, in ins.	20·5	15·4	15·4	15·3	18·1	13·0	16·4	15·6	11·4	10·1	10·3	8·3	11·0	8·0	8·0	7·4	8·0	7·5	..	..	..	..	..	..	..

NOTE.—There are also quick-fire guns; see Table of Krupp Q.F. guns. The 30·5, 26, and 24-cm. guns fire steel armour-piercing projectiles.
* Maximum twist. † Including taper entrance into bore. ‡ In most cases steel shells.

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ITALIAN NAVAL ORDNANCE.

	Armstrong Breech Loading.				B.L.	Armstrong Muzzle Loading.							Muzzle Loading. Old Pattern.		Breech Loading.		Armstrong Quick Firing.			
Designation by Calibre, in centimètres	43·1‡ New Pattern.	43·1‡ Early Pattern. 1882.	34·3	12·0	12·0	45·0	27·9 New Pattern.	25·4 No. 1 Long.	25·4 No. 2 Short	25·4 No. 2.	22·8	20·3	16	16	7·5 No. 1.	7·5 No. 2.	15·2†	14·9	12·0*	12·0§
Calibre, in inches	17	17	13·5	4·72	4·72	17·72	11	10	10	10	9	8	6·5	6·5	3	3	6·0	5·87	4·7	4·7
Length: Total, in feet	40·75	39	36·09	8·5	9·25	32·7	14·4	14·4	14	13·8	13·8	10·8	11·8	10·6	5·8	3·3	13·8	13·87	16·2	13·0
Length: Rifled Bore, in inches	346·8	315·7	..	75	88	302	121	120	114	112	106	89	96	87	52	27	126	..	189	..
Length: Powder Chamber, in inches	84·5	98	..	10·8	22	56·5	24·5	26·0	26·0	14·0	19·5	15·7	21·3	21·3	10·2	7·9	28	..		..
Length: Bore, in Calibres	27	26	..	20·2	23·5	20·5	13·2	14·6	14·0	12·6	13·9	13·1	16·8	15·5	20·7	11·7	26	..	40	35
No. of Grooves	82	82	56	37	36	28	9	7	7	8	6	6	6	6	12	12	28	28	22	22
Twist of Rifling, in Calibres	50	50	..	40	42	50	35	40	40	55	45	45	42·5	27·3	48	48	40	40	34·4	..
Total Weight, in tons	104·3	101·5	67·9	1·20	1·38	100	25·0	18·0	18·1	12·1	12·6	6·99	5·12	3·54	0·29	0·095	4	4·2	2·05	1·69
Firing Charge: Armour-piercing projectile, lbs.	900·0	725	630·5	5·5	9·9	551	95·2	77·6		63·9	59·7	37·7	19·8	..	..	..	39·7	26·5	12·0	..
Firing Charge: Common Shell, „	600	480	..	5·5	9·9	63·0	66·6	52·9		41·9	37·7	26·7	7·3	7·1	1·9	0·7	26·5	40	12·0	..
Weight: Armour-piercing projectile, „	2000	2000	1250	52·0	52·2	2000	540·1	451·9		331·8	315·3	191·8	103·6	..	..	..	80	about 80·0	45·0	36·0
Weight: Common Shell, „	2000	2000	1250	31·7	36·8	2000	526·9	399·0		284·4	250·0	180·0	64·6	65·7	9·4	9·4	80		..	36·2
Weight: Shrapnel „	2017	2017	1250	37·3	37·37	2180	533·5	399·0		284·4	250·0	180·0	68·3	..	9·4	9·4	80		..	29·8
Weight: Case Shot „	..	..	..	32·4	35·9	..	200·1	188·1		135·6	99·6	79·4	33·1	33·1	9·0	9·0	70	..	..	..
Bursting Charge: Armour-piercing projectile, „	32	32	17·4	2·31	2·31	32 ?	15·0	12·3		8·4	6·5	3·8	..	..	..	..	1·5	..	..	1·83
Bursting Charge: Common Shell, „	60	60	87·1	2·2	2·2	78 ?	26·0	23·8		18·2	18·8	9·7	2·87	2·87	0·31	0·31	5	..	..	3·02
Bursting Charge: Shrapnel „	5	5	4·25	0·35	0·35	5 ?	2·2	2·20		1·96	1·80	1·17	0·55	..	0·03	0·03	0·16	..	..	0·35
Muzzle Velocity, in feet	1992	1935	2016	1345	1591	1700	1329‖	1388		1373	1442‖	1353‖	1303‖	1024‖	1335	..	1946	..	1786	..
Muzzle Energy: Total, foot-tons	55,030	51,930	35,230	650·4	916·4	40,060	6859	6035		4369	36,040	22,850	1195	..	..	..	2100	..	995·4	..
Muzzle Energy: Per inch circumference, foot-tons	1035	976·3	830·8	43·9	61·8	753·4	198·6	192·2		139·1	128·6	99·8	54·4	..	..	..	114·1	..	67·1	..
Perforation at Muzzle, inches of iron	33·7	32·8	30·2	6·7	8·1	28·5	14·2	14·1		12·0	11·5	10·1	7·5	..	..	..	11·2	..	8·6	..
Metal employed in structure	St.	I. & St.		St.	St.	Steel tube in Wrought Iron jacket.							I. & St.	Cast I.	Br.	Br.			St.	

St. stands for steel, I. for iron, Br. for Bronze.

* For Piemonte. † For Piemonte, Fieramosca, Re Umberto, Ancona, Doria.

‡ There are four types of these bores, viz.: types Lauria, Lepanto, Italia, Valente. § For Duilio, Dandolo, Formidabile.

‖ In this year's tables the shell weight is altered, yet the velocity remains absolutely the same. If correct, the energies and perforations should be re-calculated; but as this unaltered velocity is out of the question, it is probably nearer the truth to leave the energies and perforations unaltered.

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RUSSIAN NAVAL ORDNANCE.

	Obuchoff Steel Breech Loading Hooped Guns.																Steel B.L. Guns.		
Designation by Calibre, in inches	12	12 Long.	12 M. 77.	11 M. 67.	11 Pattern 77.	9	9 M. 67.	9	8	8	8 M. 67.	6	6 Long.	6·03	6	Long 9-pdr.	4·2 (9-pdr.)	3·43 Long (4-pdr.)	3·43 (4-pdr.)
Calibre in centimètres	30·48	30·48	30·48	27·94	27·94	22·86	22·86	22·86	20·32	20·32	20·32	15·24	15·24	15·32	15·24	10·67	10·67	8·70	8·70
Total Length, in feet	**35	30	20	18·3	20·0	**26·25	15·0	13	**23·33	**20	14·6	**17·5	14	12·2	11·7	6·9	7·0	6·9	5·8
Length of Rifled Portion of Bore, in inches	..	..	165·0	152·0	158·0	..	124·0	..	..	..	128·0	..	118·7	106·0	98·0	61·5	65·0	62·6	53·0
Length of Powder Chamber, in inches	..	..	38·5	35·0	50·4	..	28·5	..	..	..	23·0	..	30·5	22·4	22·2	10·5	8·0	10·7	..
Length of Bore in calibres, including Powder Chamber	**35	..	17	17	18·9	**35	16·9	..	**35	**30	18·9	**35	24·9	21·3	20	17·1	17·4	21·4	..
Number of Grooves, in inches	..	..	36	36	64	..	32	32	..	..	30	..	..	24	24	24	16	24	12
Depth of Grooves "	..	0·070	0·135	0·135	0·135	..	0·110	0·110	..	..	0·090	..	0·060	0·085	0·070	0·055	0·055	0·050	0·050
Twist of Rifling in calibres	..	..	73·5	70	..	..	60	60	..	..	70	..	*24	60	68	*40	50	40	41
Total Weight, in tons	55·7	50·45	39·9	28·2	28·2	19·44	15·0	12·5	13·64	12·74	9·67	6·26	4·08	4·35	4·03	0·60	0·87	0·45	0·35
Weight of: Steel Shell, in lbs.	..	..	665·8	515·9	..	..	249·1	275·6	..	..	172·0	..	90·9	97·6	86·0	..	..	..	..
Weight of: Chilled Shell, "	..	731·9	665·8	515·9	562·2	..	275·6	264·7	..	193·1	169·8	..	119·0	86 0	86·0	..	..	..	..
Weight of: Common Shell, "	626·4	..	639·3	496·0	520·3	268·2	266·8	266·8	192·3	172·4	172·0	73·35	..	81·6	81·6	27·6	24·2	15·2	12·6
Weight of: Case Shot, "	..	..	293·2	216·1	..	..	176·4	176·4	..	..	134·5	..	..	57·3	57·3	27·6	22·3	15·2	11·0
Weight of Firing Charge: Steel Shell, "	..	..	144·4	115·3	..	..	64·2	47·0	..	..	31·5	89·38	..	14·3	18·1	..	..	..	..
Weight of Firing Charge: Chilled Shell, "	..	246·9	144·6	90·6	132·2	..	47·0	47·0	..	72·0	29·3	39·6	37·8	14·3	18·1	..	..	..	..
Weight of Firing Charge: Common Shell, "	..	..	117·3	81·6	132·2	180	42·1	42·1	88·2	72·0	28·4	39·6	..	10·8	14·3	4·5	2·6	3·1	1·3
Muzzle Velocity, in feet	..	1942	1470	1486	1516	2376	1463	1260	1925	1796	1352	2080	‡1739	1206	1463	1225	..	1444	..
Muzzle Energy: Total, foot-tons	..	19140	9974	7903	8960	10500	4095	3035	..	4321	2180	2682	1905	982	1276	..	..	..	..
Muzzle Energy: Per Inch Circumference, foot-tons	..	508·4	264·6	228·8	259·3	371·4	144·7	107·4	..	172·0	86·7	142·3	101·1	51·8	67·74	..	..	..	..
Perforation † at Muzzle, in inches	..	23·6	16·7	15·5	16·5	20·2	12·3	10·5	..	13·5	9·5	12·50	10·5	7·2	8·4	..	..	..	..

** It is doubtful if this refers to the total length of gun or of bore. * Maximum of increasing twist. † Through iron unbacked.
‡ With pyroxiline.

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SPANISH NAVAL ORDNANCE.

	Hontoria, New Pattern.					Hontoria, Pattern 83.							Armstrong, Pattern 83.						Armstrong.			Krupp.			
	Breech Loading.					Breech Loading.													Muzzle Loading.		Pattrn 81 B.L.	Breech Loading.			
Designation by Calibre	16-cm. No. 1.	16-cm	12-cm.	9-cm.	7-cm.	32-cm.	28-cm.	24-cm.	20-cm.	16-cm.	14-cm	12-cm.	24-cm.	20·3-cm	15-cm.	12-cm.	8·4-cm	7·5-cm long.	22·86-cm	20·3-cm	6-in.	15-cm.	12-cm.	8·7-cm	7·5-cm
Calibre, in inches	6·34	6·34	4·72	3·54	2·76	12·60	11·02	9·45	7·87	6·34	5·51	4·72	9·449	8·00	6·00	4·72	3·3	2·95	9·00	8·00	6·00	5·87	4·72	3·43	2·95
Length: Total length, in feet	13·8	9·63	10·4	7·8	3·7	38·7	33·8	..	..	19·3	16·91	14·5	29	18·4	17·00	13·75	7·9	7·51	13·0	11·9	14·5	17·13	11·81	6·9	6·3
Length: Rifled Portion, in inches	125·6	89·8	94·5	70·9	35·4	352·4	309·1	..	..	170·9	149·0	135·8	260·2	162·0	158·3	135·8	75·0	70·7	104·0	102·0	126·9	..	..	..	57·6
Length: Powder Chamber, in inches	31·9	17·3	23·8	17·7	6·1	86·8	77·1	..	..	49·8	43.1	39·4	66·9	43·5	31·4	19	13	13	..	..	29·7	..	..	..	..
Length: Bore, in calibres	25	16·9	25	25	15	36*	36*	..	..	36*	37	37*	35	26	32	33	27	28·7	14	14·75	26·1	35*	30*	24*	25·8*
No. of Grooves	38	38	30	22	18	80	70	60	50	40	35	30	60	33	28	22	20	18	6	4	28	36	32	24	24
Depth of Grooves, in inches	0·06	0·06	0·05	0·05	0·05	0·06	0·06	0·06	0·06	0·06	0·04	0·05	0·05	0·03	0·037	0·03	0·03	0·03	0·18	0·18	..	0·06	0·06	0·05	0·05
Twist of Rifling, in calibres	Increasing from 100 to 49.	56	Increasing from 100 to 40.			From 0 to 30.							30	45	30	40	30	35	45	40	100 to 40	25	25	40	36
Total Weight, in tons	5·6	2·71	1·4	0·59	0·10	49·2	32·5	19·8	11·5	6·1	4·1	2·6	21	11·5	5·0	2·2	0·45	0·35	12·5	9·0	4·0	4·6	2·1	0·49	0·30
Weight: Armour-piercing projectile, in lbs.	93·7	..	..	..	..	1058	705·5	436·5	253·5	132·3	88·2	55·1	445	180	100·0	40·0	..	..	2500	180·0	78·0	85·10	43·65	..	..
Weight: Common Shell, in lbs.	83·8	63·9	36·2	15·4	7·28	1058	705·5	..	..	116·8	88·2	49·6	393	180	100·0	40·0	15·0	12·0	2500	180·0	83·6	65·70	34·61	14·6	9·48
Weight: Ring Segment, in lbs.	83·8	..	33·1	17·0	7·9	..	..	..	..	116·8	..	49·6	..	..	..	40·0	15·0	12·0	..	..	..	..	34·61	14·6	9·04
Firing Charge: Armour-piercing projectile, in lbs.	26·5	..	..	..	..	529·1	352·7	220·5	127·9	..	44·1	28·7	220	90	55·0	16·0	..	..	50·0	35·0	34·0	37·48	19·29	..	..
Firing Charge: Other projectiles	24·3	15·4	13·2	6·28	0·99	..	..	..	..	..	..	..	145	65	34·0	12·0	4·0	3·75	33·0	21·0	39·0	..	..	10·3	10·4
Muzzle Velocity, in feet	1631	1493	1749	1837	1037	2051†	2034†	2034†	..	..	..	1988	1950	2020	2070	2000	1625	1709	..	..	1936	2182	2034	1539	1542
Muzzle Energy: Total, in foot-tons	1729	988	702	..	..	30870	20230	12520	..	..	..	1511	11730	5094	2972	1109	275	243	..	..	2173	2809	1252	..	..
Muzzle Energy: Per inch circumference, foot-tons	87·4	..	..	..	..	779·8	584·5	421·8	..	..	..	101·9	397·4	203·8	156·4	75·15	..	..	..	..	..	152·4	84·45	..	..
Perforation at Muzzle, in inches	9·6	..	..	..	..	29·3	28·4	21·5	..	..	..	10·5	20·9	15·0	13·22	9·09	..	..	..	..	..	12·9	9·63	..	..
Metal and Construction	St. & Cast I.		St. Hoop'd.		St.	St. Jacket and Hoops.							St.						St. and Wt. I.		St.	St.			

18 and 16-cm. Palliser guns and 16 and 13-cm. Parrot guns also exist. St. stands for Steel; I. for Iron. Three new 18-cm. (7·09 in.) guns exist of 86·6, 78·7, and 60·0 tons firing respectively projectiles of 187·4, 135·6, and 135·6 lbs. The first has a charge of 94·8 lbs., and muzzle velocity of 2034 feet, muzzle energy of 5374 foot-tons, and 241·3 foot-tons per inch, and a perforation of 16·3 in. of iron. * Total length, the length of bore not being supplied. † These figures are probably estimated, and the power of the guns so great as to be out of the question; compare with British, French or German guns, and the mistake is apparent.

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NAVAL ORDNANCE OF SWEDEN AND NORWAY.

	Sweden.													Norway.										
	Breech Loaders.			Model 76.		M. 79.	Model 81.		Model 83.		M. 85.	M. 86.	M. L	Krupp, B.L.					Armstrong, M.L.				Palliser, M.L.	
Designation by Calibre, in cms.	27	24	17	27	24	12	27	12	15	8	25	6·5	12	26	26	15	12	12	26·7	26·7	26·7	20·2	16·7	15·5
Calibre, inches	10·80	9·45	6·58	10·80	9·45	4·72	10·80	4·72	6·00	3·31	10·00	2·60	4·80	No. 2. 10·24	No. 1. 10·24	5·91	No. 2. 4·72	No. 1. 4·72	No. 3. 10·51	No. 2. 10·51	No. 1. 10·51	7·94	6·58	6·11
Total Length, feet . . .	17·46	14·96	11·27	17·65	16·24	10·32	23·10	10·29	13·87	7·37	28·33	3·79	8·87	25·59	18·77	12·63	13·78	9·60	16·87	14·65	13·45	10·82	11·58	10·30
Length: Rifled Portion of Bore, ins.	156·1	134·9	106·3	159·6	150·9	94·5	191·8	94·5	124·5	71·5	274·4	35·1	83·3	218·9	160·4	112·4	128·6	85·9	138·7	121·0	110·6	85·7	92·4	91·7
Length: Chamber, "	30·0	26·7	16·8	32·3	28·1	19·9	65·8	20·6	29·5	9·0	55·0	5·0	13·6	55·4	34·1	22·6	36·8	16·5	36·8	24·0	20·6	18·5	19·3	10·8
Length: Bore in calibres, "	17·2	17·1	18·7	17·8	18·9	23·8	23·9	24·0	25·7	24·3	32·9	15·4	20·2	30	19·0	22·8	35	25	16·7	13·8	12·5	13·2	17·0	16·8
Number of Grooves . . .	5	5	5	42	36	30	45	30	28	24	42	26	8	60	60	36	32	32	8	8	8	6	3	3
Twist of Rifling . . .	30*	30*	30*	45*	..	30*	40*	30*	30	33*	40*	..	40	∝25	45	45	∝25	40	55	55	55	50	34	34
Total Weight, tons . . .	23·6	14·4	5·2	23·6	16·4	2·5	27·1	1·9	4·2	4·2	29·8	9·4	1·9	24·8	21·7	3·9	2·31	1·38	21·7	19·7	18·2	7·4	4·9	3·4
Weight of: Armour piercing Shell in lbs.	476·2†	317·5†	107·1†	476·2†	317·5†	..	476·2†	..	100·0	..	449·7	..	..	606·3	463·0	86·0	57·3	44·1	448·6	393·5	384·9	157·4	109·8	..
Weight of: Common Shell, in lbs.	396·8	224·9	97·7	396·8	273·4	48·5	396·8	48·5	100·0	14·8	401·2	6·0	34·6	606·3	381·4	69·4	57·3	36·1	316·4	316·4	316·4	153·9	82·7	59·1
Weight of Firing Charge: Armour piercing Shell, in lbs.	83·8	59·5	22·0	90·4	56·2	..	206·4	..	35·3	..	242·5	..	..	191·8	99·2	22·0	19·8	9·9	110·2	82·7	66·1	29·8	22·0	..
Weight of Firing Charge: Common Shell, lbs.	83·8	59·5	22·0	90·4	56·2	13·8	145·5	16·0	35·3	3·3	242·5	0·9	6·6	191·8	81·6	20·9	19·8	9·9	77·2	77·2	48·5	29·8	16·5	7·72
Muzzle Velocity, feet. . .	1322	1312	1365	1378	1365	1476	1788	1640	1663	1542	2100	1148	..	1722	1575	1624	1804	1493	1549	1444	1296	1247	1329	1116
Total foot-tons	5771	3789	1384	6272	4102	..	10550	..	1918	..	13750	..	..	12460	7966	1573	1290	680	7463	5692	4484	1696	1345	..
Muzzle Energy: Per inch Circumference.	170·1	127·6	66·9	184·9	138·2	..	311·3	..	101·7	..	437·7	..	..	387·4	247·7	84·7	87·1	45·9	226·0	172·4	135·8	68·0	65·1	..
Muzzle Energy: Perforation through Iron	13·19	11·4	8·3	13·8	11·9	..	18·4	..	10·4	..	21·9	..	..	20·4	16·2	9·5	9·7	7·0	15·5	13·4	11·8	8·3	8·2	..

Sweden.—The breech-loaders have breech screw-stoppers. The whole of the guns also discharge case-shot, and the 12-cm. discharge also shrapnel.
Norway.—Besides the chilled shell, there are also chilled solid shot for the 8·5-in. and the 6·5-in. guns, and for all muzzle-loaders case-shot also, and steel shrapnel for some Krupp guns.

* Maximum rate of increasing twist. † Solid shot.

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UNITED STATES NAVAL ORDNANCE.

NATURE OF GUN.	Calibre.	Weight.	Total Length.	Total Length of Bore.	Length of Rifling.	Twist of Rifling.	Length of Chamber.	Weight of Service-charge.	Weight of Projectile.	Muzzle Velocity (Service).	Muzzle Energy.	Perforation of Wrought Iron at Muzzle.
	inch.	tons.	feet.	inch.	inch.		inch.	lbs.	lbs.	ft. seconds.	ft. tons.	inch.
4-in. B.L.R., Mark I.	4	1·5	13·7	157·3	130·3	zero to 1 in 25	24·7	12 to 14	33	2000	915	8·9
4-in. R.F.* Gun	4	1·5	13·7	157·5	128·1	..	25·4	..	33	2000	..	8·9
5-in. B.L.R., Mark I.	5	2·8	13·5	150·3	120·8	1 in 180 to 1 in 30	27·1	26 to 29	60	2000	1,660	10·8
5-in. R.F.* Gun	5	3·1	17·4	191·5	164·4	zero to 1 in 25	32·0	28 to 30	50	2250	1,754	11·1
6-in. B.L.R., Mark I.	6	4·8	15·8	176·0	136·7	1 in 180 to 1 in 30	36·9	50	100	2000	2,773	12·7
6-in. B.L.R., Mark II.	6	4·9	16·1	180·1	144·9	..	32·7	45 to 48	100	2000	..	..
6-in. B.L.R., Mark III., of 30 Cals.	6	4·8	16·3	183·8	147·3	zero to 1 in 25	34·0	44 to 47	100	2000	..	..
6-in. B.L.R., Mark III., of 35 Cals.	6	5·2	18·8	213·8	177·3	..	34·0	..	100	2080	2,990	13·2
6-in. B.L.R., Mark III., of 40 Cals.	6	6·0	21·3	243·8	207·3	..	34·0	..	100	2150	3,204	13·7
8-in. B.L.R., Mark I.	8	12·3 / 12·9	21·5	239·9	195·2	1 in 180 to 1 in 30	42·1	105 to 115	250	2000	6,932	17·4
8-in. B.L.R., Mark II.	8	13·0	21·5	239·9	195·2	..	42·1	..	250	2000	..	17·4
8-in. B.L.R., Mark III., of 35 Cals.	8	13·1	25·4	290·5	242·8	zero to 1 in 25	45·1	..	250	2080	7,498	18·1
8-in. B.L.R., Mark III., of 40 Cals.	8	15·2	28·7	330·5	282·8	..	45·1	..	250	2150	8,011	18·7
10-in. B.L.R., Mark I., of 30 Cals.	10	25·7	27·4	306·3	247·3	1 in 180 to 1 in 35	57·2	225 to 240	500	2000	13,864	22·03
10-in. B.L.R., Mark I., of 35 Cals.	10	27·1 / 28·2	30·5	343·8	283·8	zero to 1 in 25	57·2	..	500	2080	14,996	22·9
10-in. B.L.R., Mark II., of 30 Cals.	10	25·1	27·4	307·3	247·3	zero to 1 in 26·8	57·2	..	500	2000	13,864	22·03
10-in. B.L.R., Mark II., of 35 Cals.	10	27·6	31·2	354·9	294·9	zero to 1 in 25	57·2	..	500	2100	15,285	23·1
12-in. B.L.R., Mark I.	12	45·2	36·8	419·2	343·1	..	74·1	425	850	2100	25,985	27·5
13-in. B.L.R., Mark I.	13	60·5	40·0	454·5	370·5	..	80·9	550	1100	2100	33,627	30·1

* R.F., Rapid or Quick-fire.

NOTE.—The weight of fixed ammunition for R.F. 4-in. and 5-in. guns is 58 and 95 lbs. respectively.

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ELSWICK QUICK-FIRE GUNS.*

Dimensions, &c.	Quick-fire Guns of 35 and 40 Calibres.					
	12-Pdr.	20-Pdr.	4·7-Inch.		6-Inch.	
Calibre, in inches	3	3·5	4·724		6	
Length, total, in inches	108·6	144·5	194·1		249·25	
Length, in calibres	35	40	40		40	
Weight, in cwts.	10	24	41·5		127	
Weight of Projectile, in lbs.	12·5	20	45		100	
Service Muzzle Velocity, in foot-seconds	2133	2370*	2100	2265	2200	2400
Service Pressure, in tons	13·1	13·0*	12 4	14·8	12·5	14·3
Service Energy, Muzzle, in foot-tons	394	779	1376	1601	3356	3994
Service Energy, 1000 yds., in foot-tons	216	462	911	..	2480	2914
Service Energy, 2000 yds., in foot-tons	117	273	591	..	1834	2163
Proof Muzzle Velocity, in foot-seconds	2478	..	2436		2694	
Proof Pressure, in tons	23·1	Not yet proved.	18·0		19·5	
Proof Energy, Muzzle, in foot-tons	532	..	1852		5033	
Perforation through Wrought Iron at Muzzle, in inches	7·9	..	11·7		17·1	
Rapidity of Fire.						
Unaimed, greatest obtained	20 rounds per min.†	15 rounds per min.†	12 rounds per min.		5 rounds in 39 secs. 10 rounds in 1 min. 25 secs.	
Aimed from a *Gunboat in motion*	..	..	10 rounds in 1 min. 38 sec.‡		10 rounds in 2 mins.‡	
Weight of Mounting.						
Without Outer Shield, in cwts.	15·75	21·5	46		111	
With do. do.	48·0	54·5	64		217	

* The figures in this Table have been obtained from Elswick.
† Calculated results.
‡ It will be observed that although the smaller gun fires quicker unaimed, these guns cannot be laid *from a gunboat* in motion at a greater speed than 5 or 6 rounds per minute.

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CANET QUICK-FIRE GUNS.*

	Quick-Fire Guns of 45, 60, and 80 Calibres.																	
Calibre, in centimètres	5·7	6·5	6·5	7·5	9·0	9·0	10·0	10·0	10·0	12·0	12·0	12·0	14·0	14·0	15·0	15·0	16·0	16·0
Calibre, in inches	2·24	2·57	2·57	3·03	3·90	3·90	3·94	3·94	3·94	4·72	4·72	4·72	5·51	5·51	5·91	5·91	6·30	6·30
Total length, in feet	15·0	12·8	17·1	14·8	17·7	23·6	14·8	19·7	26·3	17·7	23·6	31·5	20·7	27·6	22·2	29·5	23·6	31·5
Total length, in calibres	80	60	80	60	60	80	45	60	80	45	60	80	45	60	45	60	45	60
Weight of Piece, in tons	0·79	0·81	0·94	1·23	2·17	2·51	1·67	2·95	4·18	2·85	5·12	6·00	4·58	8·10	5·61	9·94	6·81	12·10
Weight of Steel Projectile, lbs.	6·61	8·82	8·82	13·23	22·05	22·05	28·66	28·66	28·66	46·30	46·30	46·30	70·55	70·55	88·19	88·19	110·2	110·2
Muzzle Velocity, in foot-secs.	3150	2723	3182	2760	2789	3281	2428	2789	3281	2461	2822	3281	2461	2822	2461	2822	2461	2822
Velocity at 2500 mètres, in foot-secs.	1404	1243	1476	1388	1535	1811	1378	1578	1857	1486	1707	1982	1568	1798	1624	1867	1690	1932
Energy at Muzzle, foot-tons	454·9	453·3	619·3	695·0	1421	1841	1172	1536	2140	1944	2555	3456	2952	3895	3703	4869	4632	6086
Energy at 2500 mètres, foot-tons	90·4	94·6	133·4	176·6	360·4	501·4	375·9	495·7	685·5	709·1	934·5	1261	1203	1582	1613	2131	2183	2843
Perforation through wrought iron at Muzzle — By French formula, ins.	11·4	10·0	12·4	11·4	13·7	18·2	12·2	15·1	19·7	14·8	18·4	23·2	17·2	21·2	18·5	23·2	22·2	25·2
Perforation through wrought iron at Muzzle — By English formula, ins.	8·4	7·9	9·1	9·0	10·3	12·2	10·2	11·7	13·8	12·0	13·8	16·0	13·7	15·7	13·4	17·0	16 0	18·4
Perforation at 2500 mètres — By French formula, ins.	..	..	..	..	..	..	5·1	..	..	..	..	..	..	..	9·8	..	11·4	..
Perforation at 2500 mètres — By English formula, ins.	..	..	..	..	..	..	5·6	..	..	..	..	..	..	..	9·6	..	10·9	..

NOTE.—The Canet 15-cm. and 12-cm. guns fire respectively 12 and 10 rounds per minute.

* The figures in this Table have been obtained from Canet, except that they are here converted into English measures.

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KRUPP QUICK-FIRE GUNS.*

	Quick-Fire Guns of 35 and 40 Calibres in length.																							
Calibre, in centimètres	4	4·7	5	5·3	5·7	6	7	7·5	8	8·4	8·7	9	10·5	10·5	12	12	13	13	14	14	15	15	16	16
Calibre, in inches	1·57	1·85	1·97	2·09	2·24	2·36	2·76	2·95	3·15	3·31	3·43	3·54	4·13	4·13	4·72	4·72	5·12	5·12	5·51	5·51	5·87	5·87	6·30	6·30
Total length, in feet.	5·25	6·17	6·23	6·96	7·48	7·87	9·19	9·84	10·50	11·08	11·42	11·81	12·07	13·78	13·78	15·75	14·93	17·06	16·08	18·37	17·13	19·55	18·37	21·00
Length of Bore, in inches	57·1	68·9	73·2	77·8	83·7	88·0	102·6	110·0	117·3	123·2	127·6	131·9	133·1	153·6	152·6	176·2	164·4	190·0	177·6	205·1	189·0	218·1	202·8	234·3
Length of Gun, in calibres	40	40	40	40	40	40	40	40	40	40	40	40	35	40	35	40	35	40	35	40	35	40	35	40
Weight of Piece, in lbs.	231·5	418·9	496·0	606·3	738·5	848·8	1344·8	1653·5	1984·2	2314·9	2535·3	2866·0	..	..	..	..	..	..	..	..	..	..	..	..
Weight of Piece, in tons	..	..	..	..	0·33	0·38	0·60	0·74	0·89	1·03	1·13	1·28	1·18	1·38	1·87	2·17	2·44	2·85	3·10	3·57	3·27	4·35	4·68	5·41
Weight of Steel Projectile, in lbs.	1·76	3·31	3·86	4·85	6·06	6·61	10·47	12·90	15·43	17·86	19·84	22·04	26·5 30·9 35·3	26·5 30·9 35·3	39·7 44·1 52·4	39·7 44·1 52·4	50·7 58·4 66·1	50·7 58·4 66·1	62·8 72·8 82·7	62·8 72·8 82·7	76·1 88·2 100·3	76·1 88·2 100·3	94·8 110·2 123·5	94·8 110·2 123·5
Weight of Charge, in lbs.	0·34	0·63	0·79	0·90	1·06	1·19	2·09	2·58	2·87	3·42	3·64	3·97	5·29	5·29	7·72	7·72	10·03	10·03	12·57	12·57	15·43	15·43	18·74	18·74
Muzzle Velocity, in ft.-secs.	2231	2231	2231	2231	2231	2231	2231	2231	2231	2231	2231	2231	2329 2165 2034	2461 2297 2133	2329 2165 2034	2461 2297 2133	2329 2165 2034	2461 2297 2133	2329 2165 2034	2461 2297 2133	2329 2165 2034	2461 2297 2133	2329 2165 2034	2461 2297 2133
Muzzle Energy, in foot-tons	61	114	133	167	209	228	361	445	535	601	683	777	1013†	1114†	1503†	1653†	1895†	2085†	2372†	2609†	2876†	3163†	3542†	389·5†
Calculated perforation through wrought iron — German‡	..	..	..	..	..	..	..	..	..	..	..	..	9·3†	9·9†	10·4†	11·4†	11·6†	12·4†	12·6†	13·4†	13·5†	14·4†	14·5†	15·5†
Calculated perforation through wrought iron — English	3·7	4·6	4·9	5·3	5·7	5·8	6·8	7·3	7·7	8·0	8·4	8·8	9·3†	9·7†	10·6†	11·1†	11·4†	11·9†	12·3†	12·9†	13·1†	13·7†	14·0†	14·7†

* The figures in this Table have been obtained from Krupp, except that they are here converted into English measures.

† NOTE.—These Energies and Perforations are for the heaviest projectile of the three given above, and therefore for the lowest velocity as calculated on the English system, and also presumably on the German system.

‡ This is obtained by adding 25 per cent. to the perforations through steel given in Krupp's Tables. The Krupp 16-cm. gun fires 8 rounds per minute; the 15-cm. gun 9 to 10, and the 12-cm. gun 10 rounds per minute.

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Table Relating to Conversion of Measures.

Length.

Metric to English. | English to Metric.

I. Mètres.	II. Yards.	III. Feet.	IV. Inches.	V. Yards.	VI. Mètres.	VII. Feet.	VIII. Mètres.	IX. Inches.	X. Centimètres.
1	1·0936	3·2809	39·37	1	0·91438	1	0·30479	1	2·5400
2	2·1873	6·5618	78·74	2	1·82877	2	0·60959	2	5·0799
3	3·2809	9·8427	118·11	3	2·74315	3	0·91438	3	7·6199
4	4·3745	13·1236	157·48	4	3·65753	4	1·21918	4	10·1598
5	5·4682	16·4045	196·85	5	4·57192	5	1·52397	5	12·6998
6	6·5618	19·6854	236·22	6	5·48630	6	1·82877	6	15·2397
7	7·6554	22·9663	275·60	7	6·40068	7	2·13356	7	17·7797
8	8·7491	26·2472	314·97	8	7·31507	8	2·43836	8	20·3196
9	9·8427	29·5281	354·34	9	8·22945	9	2·74315	9	22·8596

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of yards in 2354 mètres (see cols. I. & II.).	of feet in 12·4 mètres (see cols. I. & III.).	of inches in 30·5 centimètres (see cols. I. & IV.). Note, 1 m.=100 cm.	of mètres in 1026 yards (see cols. V. & VI.).	of mètres in 1742 feet (see cols. VII. & VIII.).	of centimètres in 17·72 ins. (see cols. IX. & X.)
mètres. yards.	mètres. feet.	cms. inches.	yards. mètres.	feet. mètres.	inches. cms.
2000=2187·3	10 =32·809	30·0=11·811	1000=914·38	1000=304·79	10·0 =25·400
300= 328·09	2 = 6·562	·5= ·197	20= 18·29	700=213·36	7·0 =17·780
50= 54·68	0·4= 1·312		6= 5·49	40= 12·19	0·7 = 1·778
4= 4·37				·2= 0·61	·02= ·051
∴ 2354=2574·44	∴ 12·4=40·683	∴ 30·5=12·008	∴ 1026=938·16	∴ 1742=530·95	∴ 17·72=45·009

Note.—A ready way of approximately converting all French measures into English inches is to multiply by 4 and apply the decimal point by common sense—Thus for a 15-cm. gun; 15 × 4 = 60. Now this Calibre cannot be 60 inches, nor can it be 0·6 inch; therefore it must be 6 inches. (The exact value is 5·906 in.)

Weight.

Metric to English. | English to Metric.

I. Kilogrammes.	II. Tons.	III. Pounds Avoirdupois.	IV. Grains Troy.	V. Tons.	VI. Milliers.	VII. Pounds Avoirdupois.	VIII. Kilogrammes.	IX. Grains. Troy.	X. Gramme.
1	·000984	2·2046	15432·3	1	1·016	1	0·4536	1	·0648
2	·001968	4·4092	30864·7	2	2·032	2	0·9072	2	·1296
3	·002953	6·6139	46297·0	3	3·048	3	1·3608	3	·1944
4	·003937	8·8185	61729·4	4	4·064	4	1·8144	4	·2592
5	·004921	11·0231	77161·7	5	5·080	5	2·2680	5	·3240
6	·005905	13·2277	92594·1	6	6·096	6	2·7216	6	·3888
7	·006889	15·4323	108026·4	7	7·112	7	3·1751	7	·4536
8	·007874	17·6370	123458·8	8	8·128	8	3·6287	8	·5184
9	·008858	19·8416	138891·1	9	9·144	9	4·0823	9	·5832

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 1 by shifting the position of the decimal point, and add together. Thus, find the number

of tons in 35 milliers (see cols. I. & II. Note, 1000 kg. =1 millier).	of pounds in 56·3 kilogrammes. (see cols. I. & III.).	of grains in 120 grammes (see cols. I. & IV. Note, 1000 grms. = 1 kg.)	of milliers in 38 tons (see cols. V. & VI.).	of kilogrammes in 68 pounds (see cols. VII. & VIII).	of grammes in 85 grains (see cols. IX. & X.).
milliers. tons.	kgrms. lbs.	grammes. grains.	tons. milliers.	lbs. kgs.	grains. grammes.
30 = 29·53	50 =110·231	100=1543·23	30 = 30·48	60 = 27·216	80 = 5·184
5 = 4·92	6 = 13·228	20= 308·65	8 = 8·13	8 = 3·629	5 = 0·324
∴ 35 = 34·45	∴ 56·3=124·120	∴ 120=1851·88	∴ 38 = 38·61	∴ 68 = 30·845	∴ 85 = 5·508

Note.—7000 grains troy=1 pound avoirdupois.

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PRESSURE.

Metric to English.			English to Metric.				Atmospheric to English.		English to Atmospheric.	
I. Kilogrammes per square centimètre.	II. Pounds per square inch.	III. Tons per square inch.	IV. Pounds per square inch.	V. Kilogrammes per square centimètre.	VI. Tons per square inch.	VII. Kilogrammes per square centimètre.	VIII. Atmospheres.	IX. Tons per square inch.	X. Tons per square inch.	XI. Atmospheres.
1	14·223	·00635	1	·07031	1	157·49	1	·00656	1	152·38
2	28·446	·01270	2	·14062	2	314·99	2	·01313	2	304·76
3	42·668	·01905	3	·21093	3	472·48	3	·01969	3	457·14
4	56·891	·02540	4	·28124	4	629·97	4	·02625	4	609·52
5	71·114	·03175	5	·35155	5	787·47	5	·03281	5	761·91
6	85·337	·03810	6	·42186	6	944·96	6	·03938	6	914·29
7	99·560	·04445	7	·49217	7	1102·45	7	·04594	7	1066·67
8	113·783	·05080	8	·56248	8	1259·95	8	·05250	8	1219·05
9	128·005	·05715	9	·63279	9	1417·44	9	·05906	9	1371·43

Note.—One atmosphere is taken to be 14·7 lbs. per square inch.

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of pounds per square inch in 32·1 kilogrammes per square centimètre (see cols. I. & II.).	of tons per square inch in 3210 kilogrammes per square centimètre (see cols. I. & III.).	of kilogrammes per square centimètre in 15 lbs. per square inch (see cols. IV. & V.).	of kilogrammes per square centimètre in 18·3 tons per square inch (see cols. VI. & VII.).	of tons per square inch in 3254 atmospheres. (see cols. VIII. & IX.).	of atmospheres in 14·6 tons per square inch (see cols. X. & XI.).
kgs. per sq. cm. — lbs. per sq. in.	kgs. per sq. cm. — tons per sq. in.	lbs. per sq. in. — kgs. per sq. cm.	tons per sq. in. — kgs. per sq. cm.	atmospheres. — tons per sq. inch.	tons per sq. in. — atmospheres.
30 = 426·68	3000 = 19·05	10 = ·7031	10 = 1574·9	3000 = 19·69	10 = 1523·8
2 = 28·45	200 = 1·27	5 = ·3516	8 = 1259·95	200 = 1·31	4 = 609·5
0·1 = 1·42	10 = ·06		0·3 = 47·25	50 = ·33	0·6 = 91·4
∴ 32·1 = 456·55	∴ 3210 = 20·38	∴ 15 = 1·0547	∴ 18·3 = 2882·1	∴ 3254 = 21·36	∴ 14·6 = 2224·7

ENERGY.

Metric to English.		English to Metric.	
I. Mètre-tons.	II. Foot-tons.	III. Foot-tons.	IV. Mètre-tons.
1	3·2291	1	0·3097
2	6·4581	2	0·6194
3	9·6872	3	0·9291
4	12·9162	4	1·2388
5	16·1453	5	1·5484
6	19·3743	6	1·8581
7	22·6034	7	2·1678
8	25·8324	8	2·4775
9	29·0615	9	2·7872

1 mètre-ton is termed a "dinamode" in Italy.

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus find the number

of foot-tons in 4367 metre-tons (see cols. I. & II.).	of mètre-tons in 3592 foot-tons (see cols. III. & IV.).
mètre-tons. — foot-tons.	foot-tons. — mètre-tons.
4000 = 12916·2	3000 = 929·1
300 = 968·72	500 = 154·84
60 = 193·74	90 = 27·87
7 = 22·60	2 = ·62
∴ 4367 = 14101·26	∴ 3592 = 1112·43

PERFORATION THROUGH IRON AND STEEL.

To obtain perforation through steel equivalent to a given perforation through iron, and *vice versâ*.

1 inch steel = $1\frac{1}{4}$ inches iron;

that is, 4 inches steel = 5 inches iron.

Thus, given 9·4 inches perforation through iron,

$$9{\cdot}4 \times \frac{4}{5} = 7{\cdot}52 \text{ inches steel;}$$

or, given 5·2 inches steel,

$$5{\cdot}2 \times \frac{5}{4} = 6{\cdot}5 \text{ inches iron.}$$

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PART IV.

STATISTICS, OFFICIAL STATEMENTS AND PAPERS.

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I.

Statement of the First Lord of the Admiralty explanatory of Navy Estimates, 1892–93.

Expenditure 1892–93.

The estimated naval expenditure to be voted by Parliament for the year 1892–93 is £14,240,200, being an increase of £25,100 over the original Estimates of the preceding year. This sum does not include the whole of the funds available for naval services during the forthcoming year.

Under the financial provisions of the Naval Defence Act, it was enacted that an annuity of £1,428,000 for seven years should be charged upon the Consolidated Fund to meet the cost of the contract-built ships. This is not shown on these votes. It was also provided that if any portion of the sums annually voted and appropriated to the building and armament of certain specified ships were unexpended at the close of the financial year, the sums so unexpended were to be carried forward and be available to meet in subsequent years the cost of the work for which they were voted. The unexpended balances on the 1st April, 1892, are estimated to be £75,000 for new construction, and £568,000 for armament and warlike stores, and these sums are at the disposal of the Admiralty, though the expenditure which they cover is not included in the Estimates of 1891–92. This balance represents the surplus supplied out of taxation in preceding years towards the building and armament of the dockyard ships of the Naval Defence Act.

New Construction.

The ships building and completing during the year 1891–92 were composed of four groups, viz.:—

1. Old programme—that is, ships commenced anterior to the Naval Defence Act, 1889.
2. Australian flotilla, built under Imperial Defence Act.

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3. Contract-built ships of Naval Defence Act, paid for by special provisions out of Consolidated Fund.

4. Dockyard-built ships of Naval Defence Act.

Of the ships in the old programme all are in commission or reserve except the Blenheim, whilst the Australian flotilla were commissioned last summer, and have for some time formed part of the sea-going fleet in Australian waters.

The contract and dockyard-built ships only need, therefore, occupy our attention in considering the Estimates for 1892–93.

Contract-built ships.

The number of ships to be built by contract under the Naval Defence Act was thirty-two, and comprised—

1st-class Battleships	4
1st-class Cruisers	5
2nd-class Cruisers	17
Torpedo Gunboats	6

In my statement last year I anticipated that the progress of work on these ships would be sensibly affected by the continued activity in mercantile shipbuilding, and the difficulties then indicated have not since diminished. The contract dates for delivery of the vessels completed and transferred to the Admiralty have been considerably exceeded, whilst the work on those not yet delivered is in such a condition as to render it probable that they will be equally backward.

During the past year eleven of the seventeen second-class cruisers have been delivered by the contractors (of which eight will be completed), and the remaining six are so far advanced that the completion of this section of the contract work will be concluded early in the financial year 1892–93.

Of the five first-class cruisers building by contract, two have already been launched, and the others are approaching that stage of progress.

Of the four first-class battleships, one was launched on March 1st. The second, which is nearly as far advanced, will as a matter of convenience not be floated for a few months, she being built in dock. The third will probably be launched in May, unless some unavoidable hindrances occur; and the fourth probably a few months later. It is, therefore, probable that the final stages of the completion of these vessels will extend into the financial year 1894–95.

The six torpedo gunboats to be ordered by contract under the Naval Defence Act were commenced in July 1891; and there is every reason to hope that they will be completed for sea in 1893.

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The number of ships to be built by the dockyards under the Naval Defence Act was thirty-eight, and was composed of— **Dockyard-built ships.**

1st-class Battleships	4
2nd-class Battleships	2
1st-class Cruisers	4
2nd-class Cruisers	12
3rd-class Cruisers	4
Torpedo Gunboats	12

These vessels were gradually laid down as slips became vacant, and the scheme for their construction was adjusted to fit in with work already commenced, so as to ensure to the dockyards continuous work without sudden variations in the numbers borne on the establishment. All the vessels were to be completed before April 1894.

During the year 1891–92, under the Naval Defence Act, two second-class cruisers, the Adromache and Apollo; four third-class cruisers, the Pallas, Pearl, Philomel, and Phœbe; and two torpedo gunboats, Gossamer and Gleaner, have been completed.

All the first-class battleships building in the dockyards are now afloat, the Repulse having been launched on the 27th February. The Empress of India has proceeded under her own steam from Pembroke to Chatham, where she and the Hood (built at that yard) are now in progress of completion for sea.

An exceptional rate of progress has been maintained in the work on the Royal Sovereign throughout the period of her construction. It was desired to hasten her completion as much as possible in order that experience might be gained at sea with the first vessel of this important class, whilst her sister-vessels were still in such a stage of progress that advantage could be taken of that experience. During the last six months, therefore, exceptional arrangements have been made to advance her completion, and it is now practically certain that on May 31st she will be commissioned as flag-ship of the Channel Squadron, which will be 2⅔ years from the date her keel was laid. Such an unprecedented feat of naval construction reflects great credit on Portsmouth Dockyard and all concerned in her design and construction.

The three first-class cruisers, Edgar, Hawke, and Royal Arthur, will also be completed in 1892–93, as well as the two second-class cruisers, Brilliant and Æolus, and the four torpedo gunboats, Circe, Leda, Alarm, and Antelope.

This will leave three battleships of the first class, two of the second class, one first-class and eight second-class cruisers, and six torpedo gunboats of the dockyard-built vessels to be completed in

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1893–94 in accordance with the Naval Defence Act, and no difficulty is anticipated in doing this.

In addition to the above, there will be the four first-class battleships, five first-class cruisers, and six torpedo gunboats building by contract to be completed in the dockyards after delivery, making a total of thirty-five vessels to be completed after the financial year 1892–93, assuming that our anticipations of the completion of vessels in the year 1892–93 be realised.

Dockyard work.

These finishing stages of work on warships involve large relative expenditure on labour as compared with material, and heavy demands on certain portions of the yard plant; but they do not provide suitable or sufficient employment for all classes of workmen. It may, therefore, become advisable, under the conditions created by the late delivery of ships by the contractors, to make some re-arrangement of the programme now being executed under the Naval Defence Act, and to prepare for commencing a new programme in order to secure the most economical and continuous employment of all classes and trades in the dockyards. An essential condition for such employment is the providing of work in all stages of advancement on new ships, so that some may be preparing to build, others be advanced to different stages, and others completing.

The liabilities to be met out of the Annual Estimates for the completion of all the ships contemplated under the Naval Defence Act is estimated to be at the close of the financial year 1891–92 about £3,737,000; of this £2,270,000 will be defrayed in 1892–93, leaving £1,467,000 for the year 1893–94. In the subsequent year the estimates will be free from all charge for this programme. Reversing the statement and estimating the amount available for a new programme on the assumption that the sum now voted to new construction, viz., £2,350,000—a sum not more than sufficient to maintain the standard of strength in 1895—remains a constant annual amount, there will be available for this purpose in

	£
1892–93	70,000
1893–94	880,000
1894–95	2,350,000

To develop in two years, from so gradual a start, a scheme of shipbuilding adequate to the full employment of the dockyards may be difficult; it may therefore be found desirable to carry over into a period subsequent to April 1894 the completion of a small proportion of the vessels building under the Naval Defence Act. By such an arrangement the continuity and economy of employment

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of all trades in the yards will be possible, and fluctuation in the numbers employed will be avoided.

We have therefore decided to make preparations for the commencement of a new scheme of shipbuilding, but for the year 1892–93 to limit it to laying down three new battleships. The large number of cruisers now advancing and completing have placed us in comparison with other nations, so far as this class of warship is concerned, in a favourable position. New programme.

The principal features to be embodied in the designs of new battleships have been carefully considered by the Board, with special reference to recent foreign shipbuilding policy and the latest developments of armaments, armour, and propelling machinery. It has been decided that the introduction of quick-firing guns of large calibres, and the use of high explosives, necessitate changes in the character and distribution of the protective hull armour, and the increase of protection to gun crews. It has also been determined that further steps must be taken in the direction followed in the Royal Sovereign and Centurion classes, so as to give even greater relative power and prominence to the secondary armament of quick-firing guns. In relation to the heavy-gun armaments, the fullest inquiry has been made into the relative advantages and disadvantages of guns of different calibres, lengths, and ballistics, having regard, not only to their powers of perforating thick armour, but to their shell-fire and destructive effect against unarmoured or lightly-armoured structures. The subject of the speed and coal endurance appropriate to battleships has been investigated, in the light of the most recent experience and of the results obtained in the extensive trials of coal-consumption made on actual service during the last two years.

Sketch designs have been prepared on the basis of these discussions, and the preliminary steps have shown that, while keeping within the size and cost of recent first-class ships, vessels possessing adequate powers of offence and defence can be produced on the lines decided upon.

Before the dockyard vote is disposed of full details of the main features of the new vessels will be laid before Parliament. For the present it is sufficient to say that they will be first-class battleships of large displacement, of high freeboard and speed, large coal capacity, and carrying as a main armament four guns of large calibre, and as a subsidiary armament a large number of well-protected quick-firing 100-lb. guns.

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The new programme commences modestly, comprising at present only three battleships and ten torpedo-boats; but in the course of the next twelve months I propose to extend and elaborate a much larger scheme for submission to Parliament next year, so that the material may be bought and the arrangements made for a fresh start early in 1893–94. The amount available during the next five years for a new programme, if the sum now voted for new construction remain unaltered, is about £8,000,000, independent of the cost of armament, and exclusive of the completion of the Naval Defence Act.

Torpedo-boats and torpedo gunboats.

Much discussion has recently taken place as to the functions of torpedo-boats, and the assumed deficiency of our Navy from the limited number of such vessels at their disposal.

A torpedo-boat is essentially the weapon of the weaker, and of the assailant rather than the defender of commerce. Protection against such boats and their attack must be looked for in the development and increased accuracy of machine and quick-firing guns, mounted in vessels capable of keeping the sea in rough weather. The Admiralty have, during the last few years, built a considerable number of such vessels, and they believe that as a protection they will be superior to any accumulation of mere torpedo-boats, and will be useful both as scouts and dispatch vessels. Recognising, however, the great improvements that have taken place in first-class torpedo-boats during the last few years, they propose to build ten such boats by contract.

A substantial improvement has been made in the last five of the torpedo gunboats of the Naval Defence Act, which requires notice as illustrating my contention that it is to sea-going vessels of this type with quick-firing guns and a relatively steady platform that we must largely rely for defence against torpedo-boats.

Before ordering these vessels a careful review was made of experience gained at sea with vessels of the Sharpshooter class. This experience was favourable, but it was obvious that substantial advantages could be gained by building the remaining five vessels of a larger size and at somewhat greater cost. This increase in size permitted of the addition of a poop, the raising of the freeboard forward, carrying with it greater fighting efficiency, a steadier gun platform, and better accommodation for officers and men, in addition to improved sea-going qualities and a greater power of maintaining speed in rough water.

Halcyon class.

These five larger vessels, which may be named as a class after

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the Halcyon, which has been first commenced, will have the following principal dimensions :—

Length	250 ft.
Breadth	30 ft. 6 in.
Displacement	1,070 tons.
Horse-power with natural draught	2,500 „
„ „ „ forced draught	3,500 „
Mean speed on measured mile (natural draught)	17 to 17½ knots.
„ „ „ „ (forced draught)	19 knots.

The weight of the machinery has been considerably increased as compared with the Sharpshooter class, and the maximum horse-power has been diminished in view of the difficulties that have occurred with the locomotive boilers of the Sharpshooter.

The armament will include two 4·7-in. quick-firing guns, four 6-pounders, and five torpedo-tubes for 18-in. torpedoes.

Reconstruction.

The great number of new ships building at the yards during the last three years has somewhat thrown back the work of reconstruction and re-armament of a number of the older ironclads. The alteration and adaptation to the requirements of the day of vessels of a past date is less attractive work than the designing of new vessels, and thus there is a tendency during any very busy period of new construction to put on one side the expensive and humdrum work of re-boilering and re-engining vessels which have been long in commission.

But if our Navy is to be really efficient, and by efficient I mean be in a condition to do effective sea-going work with the great mass of the vessels on the active list, a continuous system of reconstruction and re-boilering is hardly less important than the constant prosecution of new construction. The life of every ironclad as an effective fighting-machine of the first order in these days of constant improvement is comparatively short. The longer a vessel of any size requiring large repairs is left untouched, the less do the repairs repay their cost.

In contrasting the numbers of our Navy with those of foreign nations, sufficient attention is rarely given to the far larger proportion of our fleet which are abroad and employed in work necessitating a constant wear and tear of the ships so engaged. France, next to Great Britain, has the largest Navy and the greatest Colonial possessions of any European country. In December 1891 (excluding the Mediterranean Station) there were only thirteen French ships on foreign stations as against forty-seven of our Navy. The difference in numbers, great as it is, does not accurately convey a

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full sense of the disproportion between the foreign duties of the two Navies, for the English ships, on the average, are larger and of more modern type. This work, so far from decreasing, must, as our Colonial and external interests expand, grow also. Four years ago the annual coal bill of the Navy was £274,000, now it is estimated at £530,000; and, although a certain proportion of this increase is attributable to the increase of auxiliary machinery and electric light, the bulk is due to the greater activity of our ships on foreign stations. A greater sum must hereafter be annually allocated to the heads of reconstruction, re-engining, re-boilering, and large repairs, if readiness for service is to be the condition of the bulk of ships in reserve.

Old battleships re-arming and re-engining.

We have, therefore, increased by £120,000 the amount to be spent in 1892–93 on this work, and this will give a most satisfactory return, so far as battleships are concerned. The re-arming and re-engining of the Hercules, Rupert, and Devastation will be completed in this year.

The repairs and re-boilering of the Ajax and Téméraire will also be practically finished, and the Monarch and Sultan will also be taken in hand, and the former so advanced as to allow of her completion in the following year. Proposals are also under consideration for re-boilering Northumberland and Agincourt.

The Bellerophon will be brought home from the North American Station and fitted for service as a coastguard ship.

This catalogue almost exhausts the list of armoured battleships worth repairing, and the arrangement proposed will add to our effective strength in home waters five battleships in 1892–93 and two subsequently.

Stranding of Victoria.

Although it is a matter for regret that such an accident as the grounding of the Victoria should have occurred, yet it has incidentally given a strong proof of the efficiency of the system of construction adopted in Her Majesty's ships. The steel hull behaved admirably under the severe shock produced by the vessel running on a rock at a speed of nine knots; the damage done, although it extended over a considerable length, was purely local in character, and the workmanship was shown to be excellent. These circumstances greatly limited the inflow of water, and facilitated the floating of the vessel. The repairs will be carried out at Malta, and the vessel restored to full efficiency in ten or twelve weeks, at a cost of about £1500. Had it been necessary, the ship could have been again made temporarily fit for service in one-third the above-mentioned time and cost.

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The following is the summary of the work proposed to be done during 1892–93:— **Summary.**

Under new construction—

10 vessels will be completed.
20 will be advanced sufficiently to be completed in 1893–94.
2 ironclads will be commenced in the dockyards and 1 by contract.
10 first-class torpedo-boats will be commenced by contract.

Under reconstruction—

5 ironclads of the older type are to be finished, and 2 more to be advanced sufficiently to be finished in 1893–94.

This is independent of the contract-built ships of the Naval Defence Act, nine of which will be completed after delivery this year, and fifteen are to be materially advanced.

Steam Trials and Machinery.

In my statement of last year I explained at some length the nature of the difficulties which have been experienced in passing successfully and satisfactorily through their trials the propelling machinery of certain ships.

During the last year these difficulties have not disappeared, but in the steam trials of vessels during the last two years there has been a marked difference between the performances of the vessels of the Naval Defence Act and those of an antecedent period.

All the vessels building under that Act, sufficiently advanced for steam trials, have passed them with ease, and in every case attained both a power and a speed in excess of that estimated, with the single exception of two torpedo gunboats. I therefore take their performances first.

Up to 1st April, 1891— **Trials before April, 1891.**

Latona	2nd-class Cruiser.
Pearl	3rd-class Cruisers.
Philomel	3rd-class Cruisers.
Pallas	3rd-class Cruisers.

had passed their trials satisfactorily. The Latona attained a speed of 20 knots without difficulty, with an air pressure of about 1 inch.

The trials since April 1891 have confirmed the favourable anticipations which were then formed concerning the whole class, numbering twenty-nine, of which the Latona was the first.

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Second-class cruisers.

Since then the—

Andromache	2nd-class Cruisers.
Apollo	
Indefatigable	
Pique	
Melampus	
Naiad	
Sirius	
Spartan	
Terpsichore	
Thetis	
Tribune	

have obtained results as satisfactory as those by the Latona.

First-class cruisers.

Of the first-class cruisers, one only, the Edgar, has yet passed through her trials, and the sister-ship Hawke is now under trial. They were even more satisfactory than those of the smaller cruisers, for the speed attained was 20·8 knots for the four hours' forced draught, and 19·25 knots for the eight hours' natural draught, as against the estimated speeds of 19·75 knots and 18·75 knots respectively. The progressive trials were run in shallow water, and subsequent experiments have shown that the drag in shallow water on a vessel of the Edgar's dimensions may safely be calculated as reducing by fully ¾ of a knot the full speed realisable in deep water. Therefore, as far as all the classes of cruisers building under this Act are concerned, it may be confidently anticipated that they will equal the previous performances of those of their own class, and attain a speed in excess of that originally attributed to them.

Battleships.

The battleships, although they are not ready for their trials, are all fitted with a type of boiler and machinery that has never given any trouble, whilst the weights of the boilers and machinery of the second-class battleships have been increased.

Torpedo-gunboats.

The torpedo gunboats have more experimental boilers, but so far no difficulty has been found in obtaining from them good results.

There is one simple fact connected with the machinery and boilers of the vessels that have been successful which may account for much that has occurred to their less successful competitors. Their boilers have a larger proportion, from 16 to 20 per cent. of heating surface, space, and weight to I.H.P., than those previously built.

I now turn to the two less successful steam trials, and I take the performances of the Blenheim and the Vulcan, the two fastest and most powerful vessels laid down in the two years before 1889, as illustrating the great diversity of boiler performances under conditions, so far as we know, which are similar, if not identical.

Vulcan.

The Vulcan passed an eight hours' natural draught trial most satisfactorily, both as regards speed and power indicated; but in

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carrying out a series of progressive trials with lower powers and pressure, there was serious leakage in the tubes of two boilers. The boilers are double-ended, and they have a common combustion chamber. In the Thunderer our experience has been similar.

Blenheim.

The Blenheim was designed to steam, under forced draught, 22 knots per hour, and indicate a horse-power of 20,000, at natural draught to develop 13,000 I.H.P., and attain a speed of 20 knots. At her steam trial under natural draught she developed an average I.H.P. of 14,900, and an average speed of 20¼ knots, much of the run made being in shallow water. There was a slight leakage in her forward boilers. The ship then proceeded to Plymouth for a forced draught trial; before attaining the full power she covered 23 knots in one hour and four minutes, when a leakage occurred in the after boilers, which previously had worked well. As the forward boilers, which leaked on the natural draught trial, showed no indication of weakness, it was determined to put these alone under forced draught. This was done for five hours, and a speed of 19 to 19½ knots was obtained with 10,000 I.H.P. The boilers were double-ended, but with separate combustion chambers. Further experiments will be made in the direction of trying a new kind of tube-fitting, and the technical experts of the Admiralty are hopeful of overcoming the leakage of the tubes which has hitherto baffled them.

A considerable number of smaller vessels similarly boilered to the Vulcan have passed their natural draught trials, and are now working satisfactorily in commission; but the application of forced draught beyond a certain pressure is forbidden in their stokeholes.

Boiler troubles.

Without attempting to give any technical or scientific explanation of the origin of these boiler troubles, it is clear to me that they can be prevented for the future by increasing, as has latterly been done, the weight and capacity of the boilers. The extreme application of forced draught, single combustion chambers in double-ended boilers are ingenious devices for diminishing the weight of the boiler in proportion to the maximum power to be obtained from it.

I am far from asserting that, as further data and experience are obtained, these and other contrivances may not be recognised as safe and legitimate improvements in warships, but in the meantime the gain obtained is not commensurate with the risk incurred. The first double-ended boilers with single combustion chambers fitted in two of the belted cruisers gave good results; since then similar types of boilers in other ships have been a constant anxiety.

Committee of engineer officers.

Last year I pointed out the difficulty, if not impossibility, of any adequate supervision or criticism of the specifications of marine

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engines except by those who had undergone a special engineering training. Naval officers, however competent in their own departments, cannot be expected to undertake such a work. For these reasons, I, two years ago, associated with the engineer-in-chief a committee of three sea-going engineer officers for the examination and criticism of new designs of machinery. This combination has produced excellent results, for whilst in no sense relieving the engineer-in-chief from his primary responsibility to the Board, it affords to him the opportunity of obtaining a consultative opinion from three thoroughly practical men.

It may, however, be desirable to further enlarge this consultative committee, and I propose to obtain further advice and opinions from competent outside engineers and engine makers as to the form of boiler best adapted for the special work and requirements of the Navy, before I sanction the placing of any contracts for the machinery and boilers of the new programme.

Causes of boiler troubles.

The present engineer-in-chief is in no sense responsible for the machinery which has given so much trouble: he inherited his difficulties, and high praise is due to him for the courage and vigour with which he has grappled with his legacy of anxiety. A constant demand is made, both by the naval service and the public, for an increase of speed in warships, and especially in those of small displacement. It was in an attempt to respond to this call that the late engineer-in-chief, a distinguished engineer, had recourse to devices to increase speed and yet save weight. In a small vessel it is impossible with the ordinary marine boiler to give a continuous high sea-going speed such as was asked for. To obtain the high constant head of steam required, recourse must be had to locomotive boilers, tubulous boilers, and to devices for reducing the weights and capacity associated with ordinary marine boilers, as well as to the extensive use of forced draught. Every nation that has attempted to obtain high speed by such means has in some shape or other undergone an experience similar to our own.

Vulcan and Thunderer.

Until the result of further experiments is known, I do not propose to re-boiler either the Vulcan or Thunderer, the two vessels whose boilers under natural draught have given trouble. Assuming the experiments are not satisfactory, I should propose to re-boiler both. The Devastation, a sister-ship to the Thunderer, is now being refitted with large single-ended boilers with separate combustion chambers. There is money in the estimates available for these purposes.

In all the steam trials which have been made during the present financial year, the estimated speeds corresponding to the powers

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developed have been practically realised, and in some cases exceeded, and where attained have given a speed in excess of that estimated by the designer.

This is a conclusive proof that the form of the various ships tried is good, and that their trials fully justify the designer in the high estimate he made of their capacity.

Naval Defence Act. (Its Cost and Results.)

Last year I gave a forecast of the probable cost of the ships building under this Act. I anticipated that the thirty-two contract ships would be built, completed, and armed for the £10,000,000. Twelve months' further experience has confirmed this calculation.

Excess over estimates.

On the armament of the dockyard-built ships there was then estimated a saving of £313,000; on the hulls, boilers, and machinery, an excess of about £920,000, making a net excess of £607,000. This excess was due to a great rise in prices, to various improvements in gun mountings, &c., to heavier boilers, and, in the case of the ships latterly laid down, to considerable alteration and enlargement over those of a similar type which preceded them.

Causes.

Since then three changes of importance have incurred, all of which have tended towards an increase of the estimated excess of last year.

Increased size of torpedo-catchers.

The last five torpedo-boat catchers to be built were, after a full and exhaustive inquiry into the nature of the work they had to undertake, designed of larger dimensions than originally intended. The cost of the enlargement of the five vessels is about £70,000.

Increase in wages.

The wages of the dockyard *employés* were raised in the course of last year. The cost of labour was calculated on the old rates, and the proportion of the rise, appropriated to the labour on the vessels under the Act, is estimated to be £170,000.

Cost of boats.

Up to 1889 the cost of boats, pinnaces, and picket boats was included under a heading distinct from new construction, and each ship, when ready for sea, was equipped with such boats as she required from a common stock. It is contended by those who have had to audit and interpret the Naval Defence Act that, as by that Act vessels are to be equipped for sea by April 1894, the cost of providing everything necessary for that purpose must be included in the statutory limits of cost of the vessel scheduled. A charge therefore for the boats which were to be provided out of the normal expenditure has to be transferred to the debit of the Naval Defence account. The change is a mere transfer, as the normal votes are relieved to the extent to which the other account is raised. The cost

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of these boats is estimated at £150,000. On the other hand, the estimated excess of £607,000 has been largely reduced by various savings and the fall in prices.

Comparison of estimated expenditure and original forecast.

In comparing the expenditure as now estimated with the original forecast, for the purpose of testing the accuracy of the latter, it would not be fair to include charges which have since been forced on the account, such as an increase of wages, and the transfer of the charge of boats from the normal votes. Excluding these items the account stands thus—

———	Hull, &c.	Armament.
	£	£
Original sketch estimate	8,650,000	2,850,000
Present calculations	9,762,000	2,550,000
	+ 1,112,000	
	300,000	– 300,000
	812,000	
Deduct Boats £150,000; Wages £170,000 .	320,000	
	£492,000	

The excess, notwithstanding the inclusion of £70,000 for larger torpedo gunboats, is £115,000 less than that anticipated last year.

No special provision necessary.

To meet this excess, as I pointed out before, no special financial provision is necessary. Between now and April 1894 there is, after meeting all the extra charges and cost, a large sum available for the commencement of a new programme. In apportioning this further programme to the next quinquennial period, it may be found advantageous to obtain a certain extension of the time for the completion of a few of the more backward vessels now in hand; the payments thus postponed beyond April 1894, being balanced by a corresponding increase in the amount appropriated to the programme of further shipbuilding. Such a redistribution of expenditure will tend to greatly facilitate the rapid development of the new programme, and to ensure employment for all the various trades of the dockyards.

Objects of Act.

Although some time must elapse before all the work authorised under this statute is completed, it has advanced sufficiently far to enable an opinion to be given as to how far the objects, to promote which it was passed, have been attained. Its immediate object was to raise rapidly the strength of the Navy: its ultimate to initiate an effective and economical procedure for the attainment of that

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purpose, which might be permanently substituted for the more dilatory, expensive and unsatisfactory system previously in force. In the main both objects have been achieved.

The excess, though considerable in itself, is small compared to the percentage of excess on ships built under the old system, and it is to a large extent due to the increase in size of the later vessels laid down.

The placing of orders for the guns simultaneously with the commencement of the building of the ships has reversed the old order of things, and so far from ships being useless for want of guns, the guns await the ships in which they are to be placed.

But the most valuable innovation was the financial arrangement by which any unexpended portion of money, when once voted for certain ships and their armament, was retained in a suspense balance at the close of the financial year to meet subsequently the charges for which it was voted, and not returned, as before, into the Exchequer. This has ensured a continuity and active prosecution of work in hand that under the older system was impossible, and it has, for the first time, placed the dockyard officials and workmen on an equal footing to compete with the private yards in economy and rapidity of ship construction. The rivalry between the dockyards and private yards has been keen, but the dockyards have more than held their own.

It it also worth noting that the return from the increased output of work has been such as fully to absorb and neutralise the increase given a year ago to wages.

The great care and forethought given to the designs and weights of machinery and guns of the ships of this programme has enabled both to pass through their trials satisfactorily and without a hitch, and the appointment of naval officers of experience during the earlier stages of construction to supervise the proposed allocation of space, and the fittings and nautical details of individual ships, has greatly promoted the comfort and practicability of all interior arrangements.

The administrative advantages which I have enumerated are so apparent to all who have in any way been connected with the prosecution of this programme, that I do not think there is much likelihood of any departure in the future from the main principles of this procedure.

Unexpended balances.

The retention of these unexpended balances is administratively most valuable, as it provides a continuous even and reliable expenditure for new construction. So long as ships were wholly or in part built of wood the material for their construction was drawn from a natural stock, annually replenished, and with control both over the labour and the delivery of material, the expenditure on a

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ship could be calculated with nicety. Nowadays the great mass of material in a steel warship is specially prepared for each individual ship, and the heavier pieces are cast, planed, and shaped by the contractor, so that it may with the utmost precision fit the place allotted to it. As fast as this material arrives it is worked into the ship for which it is intended.

The Estimates for the forthcoming year have, under the existing Parliamentary system, to be prepared three months beforehand, in order that they may be circulated in time to Members of Parliament before the financial year closes. The estimates are based not on the closed accounts of the preceding year, but on an actual expenditure of only nine months, and the three last months of the year are those during which the deliveries from contractors are especially heavy. With every precaution it is impossible to prevent unanticipated surrenders. Every surrender so made when the liability is carried on means a displacement to a like amount of the work arranged for in the next year, or a re-vote out of fresh taxation.

Naval Ordnance.

The progress of manufacture of heavy guns during the past year has been most satisfactory. The total number of such guns completed during the year ended 31st December, 1891, was 390, as compared with 240 in the preceding year. The following table shows the number and description of each :—

Nature of Gun.	Numbers completed.
16·25-inch of 110 tons	1
13·5-inch of 67 tons	21
10-inch of 29 tons	10
9·2-inch of 22 tons	19
8-inch of 14 tons	1
6-inch of 5 tons	75
5-inch of 40 cwt.	22
4-inch of 26 cwt.	8
6-inch Q.F.	8
4·7-inch Q.F.	225
Total	390

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The number of these guns mounted and ready for ships on the 31st December, 1891, was 1623, against 1410 at the end of 1890; 126 Whitehead torpedoes have been added during the year.

During the past year 25 new ships have been armed and equipped.

A lamentable accident occurred in June last by the explosion of a 6-in. breech-loading gun on board the Cordelia. The casualties caused by this explosion are the more to be regretted as it is the first occasion upon which any loss of life has occurred on board H.M. ships from an accident with a breech-loading gun. The gun in question belonged to an old Mark of 1881, and was constructed partly of wrought iron and partly of steel. In consequence of this accident all guns of a similar Mark in ships in commission have been withdrawn and replaced by guns of a more modern Mark. Accident on Cordelia.

The manufacture of Cordite, the new smokeless powder, is now proceeding on an extended scale at Waltham Abbey; climatic trials are going on satisfactorily on various stations, and experiments are being carried out by the gunnery ships to test the qualities of this new explosive in regard to erosion and other points which have yet to be ascertained, and it is hoped that by the end of the year it may be generally accepted for quick-firing guns. Experiments with regard to its use with the larger natures of guns will very shortly commence. Cordite.

Owing to a delay in the settlement of some matters of detail, the transfer of the custody and accounts of naval warlike stores had to be postponed. The adjustments were, however, made in sufficient time to enable the duties to be undertaken from 1st October, 1891, on which date the Naval Ordnance Store Department was established and the Admiralty assumed the responsibility for the custody of the naval ordnance stores at Woolwich, Portsmouth, Devonport, and Chatham. Naval Ordnance Stores.

The question of the depôts at the foreign stations is still in process of being dealt with by a Committee, and when their inquiry is completed, as it shortly will be, the Navy will have complete control of their own munitions of war.

Armour-Plate Experiments.

The series of experiments with armour plates described in last year's statement has been continued during 1891–92, and some notable results have been obtained.

A *compound* (steel-faced iron) plate has been produced which shattered tempered-steel projectiles such as on previous trials had Compound Armour.

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proved capable of deep penetration into steel or steel-faced plates of equal thickness.

Very satisfactory results have also been obtained with *all-steel* plates tested as samples of deliveries made under current orders.

Nickel Steel Armour.

Nickel-steel has been experimented with largely. Four firms have succeeded in producing successful specimens of thin armour of this quality; while two firms have manufactured 10½-in. nickel-steel plates, some of which well combined resistance to perforation with freedom from serious cracking, and compared favourably with nickel-steel armour made abroad.

Extensive orders have been placed for nickel-steel armour, forming the secondary defence of the battleships now in progress. Several ships are either fitted or being fitted with this kind of armour, which has been proved sensibly superior to ordinary steel when used in thicknesses of 3 to 4 inches. For greater thicknesses the experimental results do not at present place nickel-steel in so good a relative position; but the inquiry is still incomplete. So far as it has gone it has proved that British armour-plate manufacturers are keeping pace with the manufacturers of other countries; and the information gained will be of the greatest value when deciding on the armour to be used in future ships. Encouraged by assistance from the Admiralty, the leading firms have spent considerable sums on experimental armour plates, and our sources of supply are now more extensive than at any previous date.

New Works, etc.

The estimate for the Works Vote shows an increase of £30,000, chiefly due to the purchase of additional dredging plant.

Portsmouth.

At Portsmouth, good progress has been made in deepening the bar at the mouth of the harbour, but a considerable amount of dredging is still required in the vicinity of the dockyard to give the necessary depth of water for modern battleships. It is proposed to continue the deepening of the River Medway to admit of the largest vessels proceeding to and from Chatham Dockyard at every tide.

Malta.

During the present financial year the new dock at Malta has been completed, and the first vessel, H.M.S. Victoria, entered the dock on the 12th February.

The new coaling station at Portsmouth is approaching completion. At the Portland coaling station the sinking of the cylinders and the formation of the bank to form the pier and camber are completed, and the superstructure will now be proceeded with.

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The naval gunnery establishment and barracks at Whale Island (Portsmouth) are practically finished, and are now occupied.

At Haulbowline the dolphins at the basin entrance, to facilitate the passage of ships, will be completed this financial year, and the sides of the deep-water channel will (if necessary) be cleared up to the foot of the dolphins when the latter are in place. The basin and dock are ready for use. Haulbowline.

Magazines for naval ordnance stores have been provided at the Cape of Good Hope, and a pier in connection with the same has been commenced. At Sydney, the Colonial Government are making good progress with the new naval depôt which they are constructing for the Admiralty at Garden Island to replace that at Circular Quay. New Magazines.

The principal new works to be commenced in 1892–93 are two new docks at Portsmouth, and an extension of the new mole at Gibraltar. At Sheerness a naval gunnery establishment will be formed in connection with the existing naval barracks, and arrangements have been made with the Home Office by which the convict prison at Chatham will be vacated and transferred to the Admiralty for conversion into seamen's barracks. New Works proposed.

Mobilisation and Arrangements for Increasing Efficiency of Reserves.

In addition to four torpedo-boats commissioned a few days previously, twenty-five ships and sixteen torpedo-boats were put in commission at the "partial mobilisation" of 1891. Nine coastguard ships and three port-guard ships, all armoured, had their crews completed. The order for the partial mobilisation was received at the ports on the 8th July; on the 9th the vessels above mentioned hoisted the pendant, and on the 13th all had reached the places of assembly. About 6500 men were added to those already afloat. Ships mobilised.

In the Report on the manœuvres of 1890 it was pointed out that the Royal Naval Reserve is not drawn upon for partial mobilisation. The system is so arranged that no more than the force actually required need be "mobilised"; and this principle is extended by successive steps to the organisation of the Reserve *personnel*. It was considered that the time had come for recourse to some experimental test of the readiness with which the services of the Reserve men might be utilised in case of emergency. Permission, accordingly, was given to a limited number to join the 1891 Manœuvre Fleet. On the 10th July—two days after the issue of the mobilisation order Reserve drawn upon.

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—469 men, viz., 217 of the first-class and 252 of the second-class of the Royal Naval Reserve, were reported as having joined the ships under the orders of the Admiral-Superintendent of Naval Reserves. All voluntarily offered their services, and all were embarked in addition to the complement. Further entries were then stopped, the orders to that effect being sent by telegraph. Satisfactory reports on the conduct and efficiency of the men embarked were sent in at the end of the manœuvre period.

This practical test of the readiness and ability of the men of the Royal Naval Reserve to come forward for sea service, was very satisfactory so far as it went, and it confirmed the favourable opinion entertained by Vice-Admiral Sir George Tryon's Committee, which completed its labours last spring, of the reliability of the Royal Naval Reserve as an efficient auxiliary to the active forces of the Navy. We, therefore, propose to increase the number of that force by 1800 this year, raising it to a total strength of 22,400, excluding officers.

Stokers.

Special arrangements have been also made to encourage stokers and firemen to join this force, and it is proposed to put men so volunteering, who pass the necessary tests, on much the same footing as regards retainer, clothing, and drills as seamen of the first class.

Report of Sir G. Tryon.

The Report of Sir George Tryon contains much valuable information as to the numbers and composition of the officers and men manning our Mercantile Marine, and shows plainly the gradual diminution of the numbers of British seamen so employed. It is a document which is worthy of close attention, and it will be laid on the table of the House. In the bulk of its conclusions the Board of Admiralty concur, and they have already given effect to several of them.

Naval Volunteers.

After full consideration the Admiralty were compelled to arrive at the decision that the Royal Naval Artillery Volunteers, as at present constituted and located, could not be of material use to the Navy as a sea-going force, though in connection with coast defence such a force could perform much useful work. Arrangements have therefore been made by which the individual members of this corps can be transferred to the War Office for incorporation with the various Submarine Mining Volunteer Corps, which have been successfully established in different parts of the Kingdom, and in this new sphere of work I hope the country will retain the services of the great majority of the old corps.

Flag-ships at Home Ports.

By commissioning the Swiftsure at Devonport in the second half of 1891 and the Nelson at Portsmouth, the substitution of sea-going armoured ships for the old wooden hulk flag-ships at the naval ports

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has been completed. Including the Triumph at Queenstown there are now four of these armoured vessels kept ready for sea at short notice, and with a large portion of their officers and ships' companies always on board.

Reorganisation of Steam Reserve.

In October 1891 a reorganisation of the Steam Reserve was brought into working order. Ships and torpedo-boats not in commission which would have been placed formerly in the "First-class Steam Reserve"—which term has been abolished—are now placed in a Fleet Reserve composed of two divisions under the Commander-in-Chief. In Division A are included ships and torpedo-boats ready for mobilisation or immediate commissioning. Should any ship require moderate repairs or alterations, during the completion of which she would be unfit for sudden commissioning, she is temporarily placed in Division B from the time she is taken in hand until the work is finished. If the repairs or alterations are considerable and require the lengthened assistance of the dockyard, she would be removed from the Fleet to the Dockyard Reserve, and treated as a ship in dockyard hands to be completed with the least possible delay. By the arrangement described, a ready reserve of different classes has been constituted, the strength of which may be regulated from time to time as desirable. A certain proportion of the engine-room and artisan ratings and Marines, which would be included in the full crew on commissioning, is assigned to each ship in the Fleet Reserve for care and maintenance duties.

Reorganisation of *Personnel.*

The methods in use for drafting and mobilising petty officers and others of all ratings and branches of the Service have been revised, and uniformity of system has been introduced at all the naval ports. The gunnery and torpedo training ships have ceased to be depôts for men awaiting draft (except as regards certain special ratings), and are now training establishments pure and simple. At each port there is a general depôt to which men of all ratings and branches—except those of special ratings as just mentioned—are attached. Though as yet only a short time in operation, the new system has given satisfactory results, it being found that there is now a more economical distribution of the *personnel* and a diminished possibility of individuals remaining an undue length of time on harbour service. Crews are kept told off for ships ready for mobilisation, and greater opportunity will be given at Portsmouth and Devonport to the petty officers and men to make acquaintance with the ships in which they would be likely to serve in case of sudden emergency.

On the occasion of the last, as well as previous mobilisations, a considerable number of gunnery and torpedo ratings had to be trans-

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ferred from the other ports to Chatham to complete the complements of the ships commissioning there. Since then a gunnery school has been established at Sheerness. This will tend to assimilate the organisation at Chatham to that of the other ports; and it is hoped that the difficulty of quickly manning ships in the Nore command will be gradually overcome as the depôt and gunnery school develop, as has already been pointed out.

New classification of ships in reserve.

The nomenclature of the ships in Reserve and the officers associated with them has been changed. The Reserve under the Commander-in-Chief will be known as the Fleet Reserve, divided into sections A and B; that under the Admiral-Superintendent as the Dockyard Reserve, with two sections C and D. The sea-going flagships at the Home Ports will be known as the Port-guard Ships, and the vessels in the different coastguard districts as the Coastguard Ships. The captain of the old First-class Steam Reserve will be known as Captain of Fleet Reserve, and the captain responsible for the Steam Reserve as Captain of Dockyard Reserve. The designations thus given will make clear at once to what portion of the Reserve each ship belongs, and avoid the confusion which the previous nomenclature at times provoked.

Complaints are sometimes made that a ship in good condition, when paid off at the close of its first commission, is, under dockyard regulations and examination, so dismantled and opened up as to be unfit for fresh work, unless by a considerable expenditure it is brought back to its previous condition of efficiency. All ships paying off after a single commission will pass into the B division of the Fleet Reserve, and be under the care and control of the Commander-in-Chief, subject to any minor repairs or alterations that may be necessary from the dockyard.

The arrangements therefore now made will be much more effective than those they supersede in keeping ships which are in reserve and ready for commission from deteriorating for want of daily attention, and in preventing ships, passing out of commission but fit for further work, from being dismantled from excess of zeal in hunting for possible defects.

Personnel and Condition of Active Lists.

Seamen.

For the last few years we have entered large additional numbers of boys in the training ships to swell the seamen lists, and the engine-room ratings have been greatly increased by direct entry. But the great pressure from the larger number of ships in com-

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mission abroad, the commissioning of sea-going flag-ships in the home ports, and the new duties imposed on the Commanders-in-Chief by taking charge of the ships in Fleet Reserve at the ports, has not yet been alleviated by any corresponding increase to the active service lists by the boys entered recently in such large numbers. In a few months a substantial relief will be felt, and for years to come a steady and continuous increase to the seamen list will occur as the larger entries of boys pass on for seamen ratings.

Naval Reserve.

Last year I estimated that if the numbers in the aggregate of those on the active list gradually reached 75,000, and if the first and second-class Naval Reserve were raised from 19,000, its then figure, to some 27,000 men, our manning resources would not, on the whole, be inadequate to the ships available for service in 1894, though in certain ratings there might be considerable shortcomings.

Committee on manning.

Admiral Sir Anthony Hoskins has since then become Senior Naval Lord at the Admiralty. He has, from his long experience, both administrative and sea-going, a complete grasp of all the intricacies and ramifications of this very far-reaching subject, and he has undertaken the duty, as Chairman of a Committee of which the other Naval Lords are members, of making an exhaustive and minute analysis of our probable wants in 1894, with a view of further testing the reliability of the general estimates upon which my calculations of last year were made.

This inquiry has necessitated the revision of the complement and ratings of every individual ship, and of the duties to be carried out by the harbour ships in time of war. Savings in many directions have been effected by this scrutiny, and, although the Committee have not concluded their labours, the value of the work already performed cannot well be over-estimated.

Principles of inquiry.

The principles upon which the inquiry has been based are :—

1. That the manning resources in 1894 should be sufficient for all the ships (with specified exceptions) in existence in October 1891; of all the ships building and completing, and of the harbour ships and establishments necessary to maintain the force when on active service.

2. That the number of active service officers and men provided in the annual estimates should be sufficient, together with trustworthy reserves and omitting those ratings which can safely be raised in an emergency, to man, efficiently and at once, every available ship, and still leave a certain proportion to meet wastage.

3. That no special provision for the Mercantile cruisers would be necessary, except to embark officers, seamen, and Marines, and Royal

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Naval Reserve men, sufficient for gunnery purposes. The remaining parts of the complement could, in the opinion of competent judges, be obtained from ordinary sources.

4. That the lists upon which the Committee should base their calculations should be those of 1894–95, which include the whole of the additions proposed this year and 2000 more in the year 1893–94.

It would not be desirable to deal with all the detailed conclusions at which the Committee have already arrived, but I can briefly indicate what additions are proposed this year, and what may be necessary next year, as well as dispel certain erroneous but not unnatural ideas concerning our *personnel* which have passed and been accepted as correct among many interested or connected with the Naval Service.

Lieutenants.

As regards the executive officers no special entries above the number now authorised by Orders in Council are immediately necessary, though a certain readjustment of the higher grades may have to be considered. The lieutenants' list is now only 936, owing to short entries ten years back. It will not attain 1000 before 1896. The sub-lieutenants' list is also proportionately short. But by making certain arrangements, by a redistribution of duty, by promotion, and a skilful use of all available resources, the deficiency of officers available for lieutenants' duties in war time can be largely met, until the numbers arrive at the authorised normal strength.

Deficiences in *personnel*. How to be met.

A careful scrutiny has been made of the requirements for, and resources and duties of, engineer officers, and the result is far more satisfactory than is generally believed. No apprehension need be entertained so far as this branch of the Service is concerned, nor is any addition to the lists necessary.

By taking together the number of seamen available on the active list, and the number which competent authorities believe to be available from the Royal Naval Reserve, the requirements under this head can be met; there is, however, a deficiency of secondary gunnery and torpedo ratings.

The deficiencies in the civilian branches of the Navy, both as regards officers and men, can be rapidly supplied from the civilian population, if the machinery for obtaining them and giving them rates of pay is in working order.

In the engine-room ratings there is a large deficiency, and there is practically no reserve of firemen or stokers. We propose this year to try to create a firemen's reserve, and the number authorised for the

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year is 700. It should be noted that a large proportion of the engine-room complements are coal trimmers. These require little training, and could be obtained rapidly in great numbers. There is also a considerable deficiency in chief engine-room and engine-room artificers. There is no reserve at present, and this deficiency will require close attention, as it is one which cannot easily be made good under existing conditions.

Increase proposed in *personnel.*

The estimate of 75,000 for the limit of the establishments on active service made last year by me may require some augmentation, but the increase will not be serious. At present, all men and boys under the Naval Discipline Act or borne on ship's book are included in Vote A., and a false impression is thus created of the number of men available for active service.

This Vote is now sub-divided, and it shows for 1891–92 :—

Available for sea service	65,188
Other service	5,812
Total	71,000

For 1892–93, we propose :—

Available for sea service	67,712
Other service	6,388
Total	74,100

being an increase of 3100 men and boys. Thus distributed—1350 additional seamen, 1250 additional boys, and 500 additional marines.

For the year following, an increase of 2000 will be necessary to meet the wants of the completed ships in 1894–95.

With the view of increasing the number of men highly trained in gunnery, a scheme has been drawn up by which all seamen (instead of a limited number of volunteers) are to undergo instruction in the gunnery schools in the early part of their service. The course is divided into two parts, and only the more efficient will be admitted to the latter part.

To bring up our *personnel* to an equality with our material as it will be in 1894, it is necessary—

That the present annual entry of cadets into the Britannia be maintained, viz.: 120.

That the annual entry of boys into the training ships for the next three years be not less than 3700, the number at present proposed.

That the students at Keyham Engineering College be kept up to the present numbers, viz., 160.

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That the artificer, firemen, and stoker classes be steadily augmented by direct entry up to 14,000. Their present strength is 12,040.

That the Royal Naval Reserve be gradually raised from 22,400 to 27,000, and include in that number not less than 4000 stokers.

That the force of Royal Marines be raised to 15,000, being an addition of 500 to the number now voted.

That the machinery for enlisting and drawing the ratings which the civilian resources of the community can be trusted to supply in an emergency be established and kept in efficient working order.

If these few principles are adhered to, and year by year supervised and readjusted to meet changes and alterations, I believe that our manning requirements will be placed on a safe and workable basis.

The estimates, however, upon which these conclusions are based are moderate. They represent a minimum standard, and one which cannot be curtailed without seriously interfering with the preparedness of the Navy for immediate service.

Past and Future Naval Expenditure.

Naval expenditure can be classified under three heads:—1st, that which relates to the supply of ordnance and munitions of war; 2nd, that which is connected with the building and completion of ships; 3rd, that which provides for the officers and men required to utilise the material completed and ready for work.

During the last few years we have reorganised the methods previously in use for the supply of both the two great branches of material, and the arrangements made have, on the whole, stood well the severe test imposed on them by the demands of the Naval Defence Act.

The rearrangement of the *personnel* on a basis adequate to new and increasing requirements was a much more difficult matter, but we believe that the proposals now made and that the principles laid down are sound and elastic, and will be sufficient to meet present and future wants. But the basis of our whole readjustment of the component parts of the Navy one to another is the standard of strength laid down and given effect to by the Naval Defence Act, and any future increase of ships beyond that standard will require a proportionate increase in officers and men.

The sums this year voted to new construction and ordnance are

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not more than sufficient to meet the annual wastage and depreciation of the Fleet when it reaches the contemplated standard of 1894, whilst the votes for officers and men must gradually increase until the full cost of the scheme for the expansion of the personnel is attained.

Work of present administration.

Looking back upon the work of the last six years, and applying to the progress made the same sub-division, the retrospect is not discouraging.

	1886.	1892.
ORDNANCE:—		
B.L. Guns (Afloat and in Reserve)	499	1,868
Light Quick-firing Guns (Afloat and in Reserve)	33	1,715
Torpedoes (Afloat and in Reserve)	820	2,874
SHIPS (Fighting):—		
In Commission—		
At home—Excluding Coast-defence Ships, Gunboats, and Torpedo-boats	15	21
Displacement Tonnage	*110,000*	*154,5*
Abroad—Total of all classes	96	110
Displacement Tonnage	*205,800*	*307,000*
Complements—Abroad	*18,100*	*23,350*
In Reserve—(Ready for Commission)—		
Excluding Coast-defence Ships, Gunboats, and Torpedo-boats—		
Fleet Reserve—		
Division A.	..	6
Division B.	..	11
Old 1st-Class Steam Reserve	10	2
Displacement Tonnage	*25,700*	*82,200*
Ships of 15 knots speed and upwards (Afloat and building). All classes except Torpedo-boats	57	140
PERSONNEL:—		
Establishments of Officers and Men (Active List)	61,400	74,100
Numbers of Royal Naval Reserve (Officers and Men).	18,300	23,500

The cost of these improved results has, to a certain extent, been met by economies effected and improved methods of administration,

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and I doubt if for the future any substantial saving can be counted upon under either of these heads.

We shall have shortly to provide for a new dock at Gibraltar, and increased dock accommodation both at Portsmouth and Devonport. Barracks will have to take the place of the old hulks, which are now used as receiving depôts. No reduction is possible on the shipbuilding and repairing vote, if the annual depreciation of the Fleet is to be made good, and any ultimate saving on the ordnance vote will be more than absorbed by the growth of the cost of the *personnel*. The plan laid down in 1889 and accepted by Parliament, anticipated that the seven years' annuity of £1,428,000 placed on the Consolidated Fund would provide for the proposed increase of the Fleet, and that on the normal estimates would fall the burden of keeping the naval services, thus augmented, in a proper condition of efficiency and readiness. I cannot, therefore, hold out any hope of the possibility of any future reduction of the expenditure now proposed, except by a sacrifice either of the strength or efficiency of the establishments contemplated some five years back.

GEORGE HAMILTON.

2nd March, 1892.

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APPENDIX.

Report on Royal Naval Reserve.

There is an increasing disposition on the part of the Royal Naval Reserve officers to come forward for twelve months' training in the Navy.

Since 1887, when the regulations on this subject came into force, 53 officers have served for a year in the Navy, and there are now 35 still serving who are in course of completing their year's service.

For short periods of service, such as summer manœuvres and courses of gunnery and torpedo work, there is no diminution of candidates.

On the active list of officers of Royal Naval Reserve there are now 124 who have served for various periods in Her Majesty's ships, against 85 at the end of 1890.

So numerous have been the applications for entry as officers in the Reserve that it has been necessary to restrict the entries by selection, in order not to block the list; but, in addition to the numbers shown on the statement below as borne at the end of 1891, it has been found possible to appoint 11 lieutenants and 53 sub-lieutenants in the early part of the present year.

The increase in entries of engineer officers is satisfactory, but gentlemen have not come forward to fill the junior grades as readily as was anticipated when the improved conditions as to pay, &c., were framed.

A Committee, under the presidency of Vice-Admiral Sir George Tryon, sat in the early part of 1891, and made various recommendations on matters in connection with the officers and men of this force.

The Committee's report has been considered at the Admiralty, and I understand the views have been generally adopted—to be worked out gradually.

An advance has been made in regard to firemen, who, whereas they formerly drew their retainers, but never appeared on board ship or before naval officers, will now be subject to the same regulations as first-class Royal Naval Reserve men, both as regards retainer and the obligation to drill (but for a less period), receiving the same drill pay and allowances. Under these altered conditions, so advantageous to the Service and to the men themselves, it is expected that the full number estimated for, which has hitherto not been reached, will be enrolled.

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The first-class and second-class Royal Naval Reserve men have been readily recruited during 1891, and in fact have somewhat exceeded the numbers estimated. An increase of 1200 first-class and 600 second-class is provided in the Estimates for 1892–93, and it is anticipated that they will be raised without difficulty.

It is an interesting fact that up to 1889 there was difficulty experienced in completing the force of first-class men to the number we desired to raise, but since then the applicants have been steadily increasing in number. It is not that we have a greater number of eligible merchant seamen than previously; but the reason may probably be found in the increasing popularity of the force among seafaring men, the closer link that binds them to the sister service, and the fact that the men who entered in the earlier days of the first formation of the force are now beginning to draw their pensions at the age of sixty, and the present generation sees more clearly the benefits of this service. The good will of the shipping companies and owners has contributed materially to the same result.

Some greater facilities for the drill of the men have been afforded. New drill batteries have been established at Cleethorpes and Greenock, and a battery at Brightlingsea has been commenced.

An experiment was tried in 1891 of calling for volunteers of the first and second-class men to serve in Her Majesty's ships during the summer manœuvres. Only short notice was given, and it was intended only to embark 300, but the men came forward so readily that 469 were embarked in the various ships before the entries could be stopped. The result was very satisfactory, both as regards the conduct of the men and their efficiency. The experiment showed that with longer notice a considerably larger number of men would volunteer if required. These Royal Naval Reserve men were in addition to the full complement of the ships.

The following statement shows the progress of the Royal Naval Reserve in 1891.

OFFICERS.

Numbers Borne.

Rank.	31st December, 1889.	31st December, 1890.	31st December, 1891.	Estimated for 31st December, 1892.
Lieutenants	103	141	203	230
Sub-Lieutenants . . .	202	262	316	390
Midshipmen . . .	173	194	232	270
Engineers and Assistant Engineers	66	87	127	140

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Rank.	During 1890.	During 1891.
Officers who have completed a year's training:—		
Lieutenants	11	1
Sub-Lieutenants	4	10
Midshipmen	1	8
	16	19
Officers who have completed their training this year, or who are now under training:—		
Lieutenants	..	6
Sub-Lieutenants	..	26
Midshipmen	..	10
	..	42
Total Officers who have been trained or are under training:—	54	88
Officers not under training who have been through the Excellent or Vernon for a short course of instruction:—		
Lieutenants	6	7
Sub-Lieutenants	3	11
Midshipmen	3	..
	12	18
Officers not under training who served in the Fleet during summer manœuvres only:—		
Lieutenants	7	8
Sub-Lieutenants	5	7
Midshipmen	4	3
	16	18

MEN.

Numbers Borne.

	1890.		1891.	
	Borne.	Allowed.	Borne.	Allowed.
First Class	9,817	9,600	10,068	9,600
Second Class	9,243	10,000	9,763	10,000
Firemen	583	700	572	700
Third Class (Boys)	238	300	187	300

Robt. O'B. Fitzroy,
Admiral-Superintendent, Naval Reserves.

27th February, 1892.

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II.

Royal Naval Artillery Volunteers.

REPORT OF COMMITTEE PRESIDED OVER BY VICE-ADMIRAL SIR GEORGE TRYON, K.C.B.

SUMMARY OF REPORT.

THE Committee are of opinion that there is no good reason for maintaining two corps of Royal Naval Volunteers, and that there is no sufficient reason for maintaining the corps raised on the system established under Act 36 & 37 Vict., cap. 77, and recommend that it shall be no longer maintained.

The Committee are of opinion that if a second volunteer force is required, it should be established on the lines of the Royal Marine Artillery, to which force it should be connected in the same manner as the Volunteer Artillery are associated with the Royal Artillery in the Army.

REPORT.

Committee have considered question of maintaining two naval volunteer forces.

The Committee have had under their serious consideration the question whether there is sufficient reason for the maintenance of two forces of Royal Naval Volunteers, viz., those called the Royal Naval Reserve and the Royal Naval Artillery Volunteers.

The Royal Naval Reserve.

The first—the Royal Naval Reserve—is a force composed of seamen and seafaring men; they are liable to be called out for service anywhere. Present strength of force, 695 officers, 20,198 men. This force will form the subject of a separate report.

The Royal Naval Artillery Volunteers.

The second—the Royal Naval Artillery Volunteers—is composed of men who have not, as a rule, practical acquaintance with the sea, but who are attracted to the profession of sailors by sympathy and aspiration. They are liable to be called out, as are the Royal Naval Reserve, but their

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services are restricted to "the defence of the coasts of the United Kingdom, the Channel Islands, and the Isle of Man, and on service in the seas adjacent; but outside these limits only with the consent of the volunteers." This force consists of 66 officers and 1849 men.

2. The Committee have inquired into and considered— **Points considered.**

1. The professions, occupations, and callings of those who enter the Royal Naval Artillery Volunteers.
2. The requirements of the regulations, what constitutes an efficient, and with it, the right to a capitation grant.*
3. Whether it can be considered a reliable force, adding, when called out, to the body of seamen available for service of the fleet, or to the naval strength of the country.
4. The reports from those who have inspected and had experience of this force; observing that while ample testimony is borne to their zeal and intelligence, yet, as a rule, many suggestions are added with the view to increase their ability to render good service in the fleet.
5. The part they might undertake in any system for mobilising our forces.
6. Whether there is any one of the suggested modes for their employ that could not be as well performed by Royal Naval Reserve men or by some other force.
7. The element of discipline inculcated under the present system.
8. The cost of the force.

Force has no assigned mission.

3. The Committee understand that successive attempts have been made, without avail, during the last few years to mature a system of mobilisation for war under which this force should have some assigned mission and duty. It has been felt that without a mission, and with it a task of usefulness, a condition exists that is not satisfactory to the country, and perhaps is still more unsatisfactory to the force itself; that a solution has not been found, it is their clear opinion, is not the fault of the members of the force, to whose zeal, loyalty, and ability handsome testimony has been made from many quarters, and especially from their colleague Sir Allen Young, who for eight years was associated with the London brigade as its commanding officer; but it is due to the system, and to the want of the sailor element in their qualifications.

Testimony as to zeal and loyalty of the volunteers.

* See Appendix A.

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Commanding officers of force meet to consider the part the volunteers could take in cases of national emergency, and Report.

4. In 1889, with the view, if possible, to solve this question, in which a difficult problem was involved—for on the one hand there was a high appreciation of their patriotism and zeal, and on the other hand a desire to unite those characteristics of the men with a stern reality, such as is represented by a national force that performs a distinct and necessary duty when called into play, and without which it is difficult to justify expenditure out of the national purse—and with the view to exhaust the subject, a suggestion was authoritatively made that "representatives from every corps should meet and agree upon some common course of action for the employment of the volunteers in time of war, either by co-operation in manning vessels, or in any other way that offered a satisfactory solution of what was really a very difficult problem." Acting on this invitation the commanding officers of the London, Liverpool, Bristol, and Clyde brigades met in London on June 11th, 12th, and 13th, to consider how their corps "could best take part with other forces in the service of their Queen and country in circumstances of war or national emergency." The commanding officers consulted with other members of the force and with gentlemen interested in it and reported, and the Committee have studied their Report.*

5. The Committee have considered this Report of the commanding officers to be an exhaustive exposition of the views of the corps they represent.

Large number of recruits enrolled annually.

6. The Committee observe that while the strength of the Royal Naval Artillery Volunteers during the last three years has been 1984 in 1889, 1873 in 1890, and 1915 in 1891, the number of recruits enrolled in 1889 was 449, and in 1890, 633; numbers compared with the strength of the volunteers far in excess of what should be required to maintain a force that possesses stability.

Commanding officers' suggestions.

7. The Committee have examined the suggestions made by the commanding officers with the view to give an increased efficiency to the force. Among other things, they suggest a "sea-going gunboat to be permanently stationed near the headquarters of each brigade, with a small establishment of artificers, stokers, and shipkeepers, in charge of a warrant officer, and under the command of the commanding officer of the brigade." They also suggest that facilities should be given for the corps to embark on certain "harbour-defence ships" to be stationed at various ports for the purpose. The Committee recognise that all these proposals, if effect were given to them, would entail a large additional cost and without a sufficient prospect of

Committee do not concur.

* See Appendix B.

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obtaining a satisfactory result. To adopt such measures would, in their opinion, be to commit a costly error.

8. The commanding officers also express a strong desire that officers commanding batteries should be granted a higher rank than at present, and that the number of subordinate officers should be increased. The main reason for asking for the higher rank is to facilitate the organisation of the corps, so as, through a process of promotion, to be able to select officers for command of batteries who are suitable for every reason, including the consideration of their social and pecuniary position, for a higher rank. On this point of rank, we have a semi-naval force with a semi-military organisation, and to give a higher naval rank to officers in command of batteries who are not competent to fulfil the naval duties that devolve on officers holding that rank when called out for service—a rank that is not given to officers of the Royal Navy or of the Royal Naval Reserve unless they have long experience at sea—would bring us face to face with difficulties that might well arise in a time of war, and be attended with serious results.

Committee consider higher rank should not be given to officers not competent to fulfil the naval duties of that rank.

9. The Committee are of opinion that naval executive rank should only be given to officers on the active list who are qualified to perform the duties that appertain to the rank they hold, which duties they are bound to perform when called out on service, and become subject to naval discipline, that takes cognisance of failure in the due performance of assigned duties.

Executive naval rank.

10. The commanding officers also report that, should it be desirable to enrol in this force persons more accustomed to sea life than the majority of those now enrolled, they believe it could readily be done, "provided the capitation grant were increased, a small retaining fee given, and the conditions of service assimilated to those of the recently raised corps of Volunteer Submarine Miners." The Committee on this point are of opinion that such a corps would enter into competition, as to recruiting, with the Royal Naval Reserve, while it would not, if raised, be on nearly so satisfactory a footing as to organisation, and it would also compete with the force they refer to—the Volunteer Submarine Miners—and they cannot concur in recommending the adoption of the suggestion.

That it is desirable to enrol persons accustomed to sea life.

Committee think this would enter into competition with existing forces.

11. At the outset the Royal Naval Artillery Volunteers began without any cost to the Crown. In 1874 £1000 was voted with a strength of 1000 members, and this increased gradually till the present year, when £6685 was voted for a strength of 2000 efficients; this does not include the value of stores and ammunition supplied, and the cost of maintenance and repairs of vessels

Cost of Royal Naval Artillery Volunteers.

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used by the corps, or the incidental expenses due to the use of gun-vessels.

The present system has failed to provide a force that justifies expenditure.

12. The Committee have weighed carefully all the points involved, and with all sympathy for those who have made sacrifices, and have unsparingly given time and leisure to promote the interests of the corps, they cannot resist the conclusion that the system under which this force was created has failed to provide a force that fulfils the hopes under which it was commenced, and therefore there is no sufficient reason to justify expenditure on its maintenance.

Former naval volunteer forces.

13. While endeavouring to obtain a solution to the problem already referred to, the Committee have gone over the history of the past with the view and in the hope of obtaining a guide for the future. They read that several naval volunteer corps have existed, going back even to the earliest history of the country, to the days of Edward the Confessor; none succeeded, but gave way from time to time to a compulsory system. In more recent times, in 1798, by Order in Council, the Admiralty were directed to raise a force called Sea Fencibles to assist in the defence of this country against invasion. In it were enrolled "all such of the inhabitants of the coast as shall voluntarily offer themselves for the defence of the coast in the vicinity of such places or within the limits of such districts 'as might be fixed by the Admiralty,'" and the Admiralty were empowered to appoint naval officers to enrol and drill them. In February 1810 this force numbered 61 captains, 245 lieutenants, and 23,455 men. A minute, February 1810, unsigned, simply records: "Acquaint Navy Board that their Lordships, having deemed it expedient to discontinue the Sea Fencibles, have given directions to the several officers employed on that service in Great Britain and Ireland to send in their accounts made up to 28th February, 1810, to which day they are to pay up the establishment." The nation was engaged in a great war at the time the force was thus finally and summarily disbanded.

Sea Fencibles.

14. History tells us that this force of Sea Fencibles was not reliable, and inspired little confidence. It was not a permanent force, but was enrolled and disbanded as occasion called.

Naval Coast Volunteers.

15. No other volunteer force was raised until August 1853, when an Act was passed "To establish and train a body of volunteers who may be called forth and employed when the defence of the realm may require, with or in aid of Her Majesty's forces, to be called the Naval Coast Volunteers, not exceeding 10,000 men;" a restriction on their service was imposed—300 miles from the coast—but this restriction was removed by Act of Parliament in 1863. In 1869, 6859 men

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were enrolled. The Report as to this force was unfavourable, and it was decided to let it die out, and it did so in 1873.

16. In 1858 a Special Commission sat and reported on naval matters, and subsequently, as a result, the Royal Naval Volunteers Act was passed in August 1859, establishing a volunteer force, viz., the existing Royal Naval Reserve, and this was the first attempt to enrol a volunteer force of *bonâ fide* seamen. The two forces previously referred to were long-shoremen and not sailors by profession. The Royal Naval Volunteers Act of 1859 was a new departure, on fresh lines, on fresh grounds, with fresh material, and it avoided previous causes of failure.

Royal Naval Volunteers (Royal Naval Reserve), established 1859.

17. The existing force of Royal Naval Artillery Volunteers was raised under the Royal Naval Artillery Volunteers Act of 1873, the year in which the Naval Coast Volunteers died out. The Act follows much on the lines of the Order in Council under which the Sea Fencibles were created in 1798, the main difference being that the Sea Fencibles were under naval officers and were composed of "inhabitants of the coast of Great Britain," and as to the Royal Naval Artillery Volunteers there is no restriction as to residence, and the officers are volunteer officers who are practically selected by the corps.

Royal Naval Artillery Volunteers, established in 1873.

18. The indication derived from the above historical sketch is that should it be hereafter considered necessary that a second force of volunteers associated with the Navy should be created, a new departure should be made and new lines followed. The view we express is supported by the success that has been obtained by affiliating a system of militia and volunteers to the several corps of the standing army of the country.

Indications to be derived from history.

19. The Committee suggest that there are grounds for maintaining that a volunteer force affiliated to the Royal Marine Artillery would prove to be not only a popular force, but from the system of training and discipline that could be easily established it would be a far more permanently valuable force than any so-termed naval force in which are enrolled men not inured to sea-life, and who have no sufficient practical experience at sea, which experience cannot be given by Government under any volunteer system we can devise.

A volunteer force affiliated to Royal Marine Artillery would be more valuable.

20. Returning once more to the Report of the commanding officers, Royal Artillery Naval Volunteers, the Committee, having considered the ordinary avocations of the members of the force, are of opinion that it is out of the question to rely on this force to afford even any part of the crew of a torpedo-boat, and that it would not be reasonable to expect them to undertake duties that severely

Royal Naval Artillery Volunteers could not form part of the crew of a torpedo-boat.

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try even those inured to exposure at sea, duties that carry with them a responsibility that cannot be adequately borne save by those well acquainted with shipping and its ways, and on the due performance of which national interests of great importance and the lives of many depend; yet there are other duties indicated in the Report of the commanding officers that could be undertaken by a volunteer force, associated with the sea service, though not composed of seafaring men or sailors by profession.

A volunteer force on lines of Royal Marine Artillery could render various services.

21. A volunteer force organised on the lines of the Royal Marine Artillery would be able to render such service as is referred to, and in addition, the present difficulty in providing efficient and suitable officers for the command of a battery would be satisfactorily met. Such a force, eligible for sea or land service, without any restriction as to the area of employ at sea, would, in addition to sea duties, be able to render other services, such as the guarding of signal stations, and the aiding the military forces in protecting our coast. It might contain within itself a body of men skilled in telegraphy and other similar duties ready for employ in our coast signal stations.

The Royal Naval Artillery Volunteers should be disbanded.

22. The Committee, whether they regard the present system or the result obtained from the present expenditure on the force, feel compelled to recommend that, while every consideration should be extended to those now in the force, it should be disbanded after due notice has been given; but that, should their Lordships decide on creating a corps affiliated to the Royal Marine Artillery, the present members of the Royal Naval Artillery Volunteers should be enabled to join it.

The Committee believe the volunteers will recognise the necessity for their recommendation.

23. The Committee are aware of the essentially naval aspirations of the corps, and that their views may not meet with the entire approval of the corps, but they believe that that patriotism that has supported the corps so long will cause the members to recognise that the Committee on their part have to deal with hard facts, and that it is their duty to recommend only that which in their eyes is of practical utility to the country, and the volunteers on their part will not fail to recognise that several endeavours, in which they have themselves assisted, have been made to fit in the existing corps with a system of mobilisation of the naval forces of the country without success, a condition that must be unsatisfactory to themselves, whereas the proposal, if approved, offers a field of real utility, and one on which expenditure of public money can be justified.

Sir Allen Young abstains from joining in Report.

24. Sir Allen Young expressed a wish to abstain from joining in this Report, owing to his feeling of sympathy with the force, and as

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an acknowledgment of the support he received from its members for many years while commanding officer of the London Brigade.

G. TRYON, *Chairman.*

C. RIVERS WILSON. ERNEST RICE.
GEORGE J. SWANSTON. T. F. HAMMILL.
THOS. H. ISMAY. W. C. ANGOVE.

F. C. ALTON, *Secretary.*
7th April, 1891.

APPENDIX A.

ROYAL NAVAL ARTILLERY VOLUNTEERS.

PRESENT STRENGTH OF FORCE, 66 OFFICERS, 1849 MEN.

Entry of Royal Naval Artillery Volunteers.

OFFICERS.—

Commanding officers of brigades forward to Admiralty the "names of persons whom they recommend for appointment as officers." Commissions are granted by Admiralty.

HONORARY OFFICERS.—

The Admiralty, on the recommendation of the commanding officer of the brigade, sanction the appointment of a number of honorary officers. These gentlemen subscribe to the funds of their brigades, but no duty is required of them, nor are they subject to discipline, or liable to be called out on service.

PETTY OFFICERS, LEADING GUNNERS, GUNNERS.—

Are appointed by the commanding officers of the battery, subject to the approval of commanding officers of the brigade.

Capitation Grant.

Capitation Grant of £1 10*s.* paid annually for each "efficient" volunteer.

To *qualify* as "Efficient," in the first instance the volunteer must attend forty drills of not less than one hour, have a competent knowledge of drills, and embark for a naval exercising cruise of a week's duration, and be present at inspection.

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To *requalify*, which is required annually, he must attend twenty-four drills of not less than one hour during the year. He need not embark again, but if he does, each day at sea counts as two of the twenty-four drills required to be put in.

APPENDIX B.

REPORT ON EMPLOYMENT OF ROYAL NAVAL ARTILLERY VOLUNTEERS.

SIR,—We have the honour to inform you that, as directed by your Memorandum, dated the 24th of April, 1889, the commanding officers of the London, Liverpool, Bristol, and Clyde brigades of Royal Naval Artillery Volunteers met at 31, Spring Gardens, on the 11th, 12th and 13th of June, to consider and suggest how, in their opinion, the Royal Naval Artillery Volunteers could best take part with other forces in the service of their Queen and country in circumstances of war or national emergency.

Having received and considered the evidence not only of the officers and members of the several existing corps, but also of gentlemen willing to raise brigades or batteries in other localities, and having conferred with the local representative committees for the defence of the northern and other ports, we have the honour to report as follows:—

(I.) That in our opinion the Royal Naval Artillery Volunteer Act of 1873 provides in a sufficiently satisfactory manner for the enrolment, government and maintenance of a body of volunteers auxiliary to the Royal Navy, and for the employment of such a body in times of actual or apprehended invasion.

(II.) That the obligations imposed by the National Defence Act of 1888 are cordially accepted by the Royal Naval Artillery Volunteers. The Act gives the Government power to call them out for actual service in time of emergency or national danger. Section 3 runs as follows:—

> "Whenever an order is in force directing that the Royal Naval Reserve or any part thereof shall be called into actual service, it shall be lawful for Her Majesty the Queen to direct the Admiralty to call out for actual service the Naval Artillery Corps, or any of them, and such direction shall have full effect

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as a direction under Section 16 of the Naval Artillery Volunteer Act, 1873, and that Act shall have effect accordingly."

It is our opinion that whenever so called out the Royal Naval Artillery Volunteers could be usefully and economically employed.

Among the various services for which we consider that they would be efficient, we respectfully submit the following for the consideration of their Lordships.

(1.) In the manner originally contemplated and specified in the Royal Naval Artillery Volunteer Act of 1873 (36 & 37 Vict., cap. 77).

Section 16 runs as follows :—

"Every officer and volunteer, and every officer and petty officer of the permanent staff belonging to every corps so called out, shall be bound to assemble at such place and embark on board such ships, and perform such service on board ship, or partly on board ship and partly on land, as may be directed by the Admiralty; but the Admiralty shall employ such officer (other than an officer of the permanent staff) and a volunteer only (unless he otherwise consent) in ships engaged in the defence of the coasts of the United Kingdom, Channel Islands, and Isle of Man, and on service in the seas adjacent."

(2.) The Royal Naval Artillery Volunteers could be employed in supplementing the crews of harbour-defence ships. Such of the volunteers as are found fit for such service, and consent (as provided by Section 16, *vide ante*), could be embarked to supplement the crews of ships in the first reserve.

(3.) They could form or supplement the crews of torpedo-boats employed in the defence of harbours.

(4.) They could supply crews for guard boats for the protection of mine fields, and if necessary assist the Royal Engineers and the submarine mining corps in boat work.

(5.) In certain localities they could assist to man and navigate fast steam vessels of any description, whether armed or unarmed, including obsolete torpedo-boats, steam fish-carriers — or private yachts, and be employed in conveying despatches from the shore to ships outside the limit of signalling distance.

(6.) The Royal Naval Artillery Volunteers could be employed to some extent as reliefs to the coastguard.

They could form guards to signal stations and submarine cable stations.

They could be trained to act as signalmen.

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They could take charge of the rocket life-saving apparatus supplied by the Board of Trade.

(7.) As a Naval Brigade employed with troops on shore, the training of the Royal Naval Artillery Volunteers must render them capable of doing good service.

(8.) We submit generally that the Royal Naval Artillery Volunteers may be trained to take the place of any naval forces removed for foreign or sea service, the more efficiently and economically if the volunteers are employed so far as is possible in the neighbourhood of their own ports.

We have confined ourselves in the above Report to the consideration of the employment on actual service of the brigades under our command. We now have the honour to submit for the consideration of their Lordships that in our opinion the efficiency of the volunteers would be greatly increased, and they would be better enabled to perform the duties above indicated, if the officers and men of the several corps were permitted from time to time as opportunity arises to serve on board the first reserve ships and the district guard ships, and to drill on board the harbour-defence ships in the steam reserve, in lieu of, or in addition to, the service in Her Majesty's gunboats prescribed by the regulations. The proficiency already acquired by the volunteers in drilling at and in firing from heavy guns at sea, justifies the commanding officers in urging that facilities be given for further training at sea.

For the services contemplated in paragraphs 4 and 5, we have among the volunteers officers and men with sufficient nautical knowledge and experience. Having in view the probable employment of a portion of the naval volunteers in torpedo-boats and other vessels required for coast defence, the commanding officers of the several brigades have for some years paid special attention to the encouragement and development among their officers and petty officers of a practical knowledge of local pilotage.

We suggest that periodically the volunteers, or a portion of them, after their first year of service might be temporarily attached to the various coastguard stations in their district, for the purpose of becoming practically acquainted with the duties which may be assigned to them.

It would greatly facilitate the systematic training of the volunteers if certain of the harbour-defence ships, to be considered and treated as in the steam reserve, were stationed at the various ports. For the naval reserve no less than the volunteers, the opportunity of drilling on board vessels of the Gorgon class would be valuable.

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It would be desirable that a sea-going gunboat should be permanently stationed near the headquarters of each brigade, with a small establishment of artificers, stokers, and shipkeepers in charge, as it has been suggested, of a warrant officer and under the command of the commanding officer of the brigade. Volunteers might embark in the gunboat at such times as interfere the least with their several occupations or trades.

From the Admiralty return to Parliament, dated 11th of March, 1889, several vessels of a suitable class are now available. Many others are shortly to be removed from the list of sea-going vessels. We submit that the employment we have suggested would be a useful and popular method for their disposal.

The commanding officers wish respectfully to impress on their Lordships the importance, in their opinion, of granting higher rank to the officers in command of batteries, and of increasing the number of subordinate officers. With the present limited prospects of advancement and the heavy pecuniary responsibility thrown on so small a number, it is difficult to obtain officers of a desirable class. Promotion to a rank higher than that at present authorised should be given only to those who qualify in gunnery, seamanship and pilotage.

Should it be the opinion of the Admiralty that at some future time it will be desirable to enrol in the naval volunteer force persons more accustomed to a sea life in their ordinary avocations than the majority of those now enrolled, the commanding officers believe that this could readily be done, provided the capitation grant were increased, a small retaining fee given, and the conditions of service assimilated to those of the recently raised corps of volunteer submarine miners.

In conclusion, we desire to convey to their Lordships the readiness of the officers and men under our command to qualify themselves in any manner their Lordships may see fit to direct. They offer their services to assist the Royal Navy in the performance of any duties for which volunteers can be trained, and are ready to obey the call in all circumstances of danger or national emergency.

We are, Sir,

Your obedient servants,

(Signed by the commanding officer of each brigade).

The Admiral Superintendent
of Naval Reserves.

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III.

THE NAVAL VOLUNTEERS.

ULTIMATUM FROM THE ADMIRALTY.

THE following is the full text of the letter issued from the Admiralty respecting the Royal Naval Artillery Volunteers:—

"ADMIRAL SUPERINTENDENT OF NAVAL RESERVES,—

"With reference to your submission of 1st of October last, N.R. 5852, I am to inform you that my Lords have arrived at the following conclusions as to the future of the Royal Naval Artillery Volunteers.

"2. Since the Report of the committee over which Vice-Admiral Sir George Tryon presided has been published, my Lords have been in constant communication with the officers commanding and others interested in the Royal Naval Artillery Volunteers, and they have considered all the representations made as to their possible future utilisation.

"3. These representations have induced my Lords to again carefully review the personal composition, training, and location of the various corps of the Royal Naval Artillery Volunteers in order to determine how far a force so composed, raised, and located could be of use in time of emergency as a reserve to the regular establishments of Her Majesty's Navy.

"4. These corps are almost exclusively composed of landsmen, whose occupations on shore preclude their acquiring the habits of a sea-faring population; their training, with the exception of seven days per annum, is confined to gun drill in hulks or batteries; while the head-quarters of each corps are far removed from the great naval arsenals and ports, where, in time of war, ships of war or improvised cruisers must be exclusively commissioned.

"5. Moreover, the returns of the last two years show that the number of annual retirements was from twenty to thirty per cent. of the total strength of the whole force.

"6. In the closer investigation given during recent years to the respective duties of the Navy and Army in time of war, the functions of the two Services have been more clearly defined than heretofore; the duty of the Navy will be almost exclusively of a sea-going character, while to the Army has been given the entire control over

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the management and manning of the coast defences of the country. Each Service must, therefore, for the future, both as regards its active establishments and reserve, enlist and recruit those only who are likely, from their training and avocation, to be able to perform the work allotted to the service to which they are attached.

"7. The War Office have, with those objects, raised effective volunteer artillery corps for sea-coast defence, as well as a corps of submarine miners; and my Lords, now looking back upon the past, regret that the Royal Naval Artillery Volunteers were not, at the time of their formation, placed under the authority of the War Office, as a distinct sphere of utility and action would then have been assigned to them, which the Admiralty find it impossible to allocate. The duties of sea-coast defence would afford an opportunity for the display of those maritime tastes which prompted the formation of the corps, without imposing on them the test which trained seamen can only comply with.

"8. My Lords, therefore, are of opinion that if the Royal Naval Artillery Volunteers are to continue as an effective force they must be transferred to the other Service, and their Lordships would be ready, if the officers and men of the various brigades agree to this transfer, to use their good offices with the Secretary of State for War for the purpose of facilitating such a change.

"9. Should this transfer not meet with the wishes of the officers and men, then my Lords would have no alternative but to disband the corps on the 31st of December next. An answer must, therefore, be received before that date.

"10. In event of disbandment, my Lords are particularly anxious to avoid as far as possible causing inconvenience to the officers and men of the force, and they will, therefore, at once appoint the committee (referred to in Admiralty letter, N. 1069, of the 24th of April last) to examine into the pecuniary engagements entered into by each corps, in respect to drill sheds, &c., &c., and to inquire generally with a view to ascertaining all just claims for compensation.

"11. The committee will be composed of three members, namely:—

"Mr. John Scott, Assistant Accountant-General;

"Mr. J. M. Maxfield, Surveyor of Coastguard Buildings;

"And an officer of the Royal Naval Artillery Volunteers.

"(This officer to be nominated by the commanding officer of his brigade, to represent his own corps when the circumstances of that particular corps are under consideration by the committee.)

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"12. My Lords desire that you will invite the commanding officers of the brigades to nominate the officers to serve on the committee with as little delay as possible.

"13. The official members of the committee will be instructed to deal with all claims for compensation, &c., in a spirit of liberality, to assume on behalf of the Admiralty all financial obligations undertaken by the various corps, and it will be empowered to recommend grants of compensation to the officers and men for the unused value of their uniforms.

"14. The following action, at the proper time, is also approved:—

"I. To direct the commanding officers of the various corps to hand over all vessels, boats, guns, small arms, and all warlike and naval stores, to naval officers or dockyards appointed to receive them; proper surveys being ordered and held in each case, and the store accounts closed.

"II. To give notice to the various corps which the Admiralty assist pecuniarily by contributions towards the maintenance of their drill halls, that such assistance will cease at the end of this year in all cases in which the rental can be terminated.

"III. The actual transfer of the stores is to take place on the same day for all stores.

London	Corps to transfer everything to	H.M.S. President.
Yarmouth	" " " "	Chief Officer, Yarmouth Battery.
Hastings	" " " "	" Hastings Coastguard Station
Liverpool	" " " "	H.M.S. Eagle.
Southport	" " " "	" "
Birkenhead	" " " "	" "
Carnarvon	" " " "	Chief Officer, Carnarvon Battery.
Llandudno	" " " "	" " "
Bristol	" " " "	H.M.S. Dædalus.
Swansea	" " " "	" "
Clyde	" " " "	H.M.S. Superb.

"IV. The caretakers of H.M. ships Frolic and Drake are to remain until those vessels are disposed of.

"V. All instructors will then be discharged and pay then cease.

"By command of their Lordships,

"(Signed) EVAN MACGREGOR."

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IV.

NAVY ESTIMATES FOR THE YEAR 1892-93.

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IV.—Abstract of Navy

Votes.		Estimates, Gross Estimate.	Estimates, Appropriations in Aid.
	I.—Numbers.		
A.	Total Number of Officers, Seamen, Boys, Coastguard, and Royal Marines	....	....
	II.—Effective Services.	£	£
1	Wages, &c., of Officers, Seamen and Boys, Coastguard, and Royal Marines	3,679,589	159,589
2	Victualling and Clothing for the Navy . . .	1,563,472	347,772
3	Medical Establishments and Services . . .	150,530	25,530
4	Martial Law	11,429	29
5	Educational Services	98,204	22,404
6	Scientific Services	70,600	10,600
7	Royal Naval Reserves	159,094	94
8	Shipbuilding, Repairs, Maintenance, &c.:		
..	Section I.—Personnel	1,896,312	30,212
..	Section II.—Matériel	1,854,500	239,000
..	Section III.—Contract Work	1,329,000	39,600
9	Naval Armaments	1,448,700	50,000
10	Works, Buildings, and Repairs at Home and Abroad .	460,000	12,000
11	Miscellaneous Effective Services	157,325	9,325
12	Admiralty Office	236,320	8,520
	Total Effective Services . . £	13,115,075	954,675
	III.—Non-Effective Services.		
13	Half Pay, Reserved, and Retired Pay. . . .	777,132	12,932
14	Naval and Marine Pensions, Gratuities, and Compassionate Allowances	965,133	23,533
15	Civil Pensions and Gratuities	314,171	471
	Total Non-Effective Services . . £	2,056,436	36,936
	IV.—Extra Estimate for Services in connection with the Colonies.		
16	Additional Naval Force for Service in Australasian Waters—Annuity payable under	95,300	35,000
	Grand Total . . . £	15,266,811	1,026,611

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Estimates for 1892-93.

1892-93.	Estimates, 1891-92.			Difference on Net Estimates.		Votes.
Net Estimate.	Gross Estimate.	Appropriations in Aid.	Net Estimate.	Increase.	Decrease.	
Total Numbers.			Total Numbers.	Numbers.	Numbers.	
74,100	....	....	71,000	3,100	....	A.
£	£	£	£	£	£	
3,520,000	3,564,778	160,778	3,404,000	116,000	....	1
1,215,700	1,475,052	329,252	1,145,800	69,900	....	2
125,000	142,330	19,630	122,700	2,300	....	3
11,400	11,715	15	11,700	....	300	4
75,800	96,516	21,016	75,500	300	....	5
60,000	72,167	10,867	61,300	....	1,300	6
159,000	153,136	36	153,100	5,900	....	7
						8
1,866,100	1,787,420	35,620	1,751,800	114,300	....	Sec. I.
1,615,500	2,077,600	214,900	1,862,700	....	247,200	Sec. II.
1,289,400	1,300,400	39,600	1,260,800	28,600	....	Sec. III.
1,398,700	1,595,310	66,610	1,528,700	....	130,000	9
448,000	424,900	7,300	417,600	30,400	....	10
148,000	149,709	9,309	140,400	7,600	....	11
227,800	229,620	8,520	221,100	6,700	....	12
12,160,400	13,080,653	923,453	12,157,200	382,000	378,800	
764,200	792,159	12,959	779,200	....	15,000	13
941,600	948,280	23,580	924,700	16,900	....	14
313,700	319,728	528	319,200	....	5,500	15
2,019,500	2,060,167	37,067	2,023,100	16,900	20,500	
60,300	69,800	35,000	34,800	25,500	....	16
14,240,200	15,210,620	995,520	14,215,100	424,400	399,300	

Net Increase £25,100

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STATEMENT showing the Actual and Estimated EXPENDITURE for NAVAL SERVICES for the Three Years ending the 31st March, 1893.

		£	s.	d.
1890-91	Estimated Expenditure (after deducting Appropriations in Aid)	13,786,600	0	0
	Supplementary Estimate (25th February, 1891)	350,000	0	0
		14,136,600	0	0
	Net Expenditure, as per Final Account	13,910,732	1	8
	Net (Expenditure less than Estimate)	£225,867	18	4
1891-92	Estimated Expenditure (after deducting Appropriations in Aid)	£14,215,100	0	0
1892-93	Estimated Expenditure (after deducting Appropriations in Aid)	£14,240,200	0	0

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STATEMENT of the Principal Points of DIFFERENCE between the ESTIMATES of 1891–92 and those for 1892–93.

INCREASES.		£
Wages, &c. of Officers, Seamen, and Marines		116,000
Victuals and Clothing		70,680
Medical Establishments and Services		2,300
Royal Naval Reserves		11,585
Wages of Artificers, &c., in Dockyards at Home and Abroad (including provision for 53 Weekly Payments of Wages)		127,485
Reduction in Amount of Contribution from the War Department on account of the Maintenance of Her Majesty's Troop Ships		9,600
Repairs, &c., of Ships by Contract		12,500
Gun Mountings, &c. (Contract)		68,656
Interest on Advances under the Naval Defence Act, 1889		15,567
Wages of Artificers and Police employed in Naval Ordnance Establishments		9,825
Decrease in Amount of Receipts arising from the Sale of obsolete and unserviceable Naval Ordnance Stores		17,230
Works, Buildings, and Repairs		30,400
Passage Money		5,500
Coast Semaphores for the United Kingdom		4,000
Annuity on account of Advances under the Imperial Defence Act, 1888		25,500
		526,828
DECREASES.	£	
Scientific Services	1,300	
Royal Naval Artillery Volunteers	5,685	
Naval Stores	233,084	
Increase in amount of Receipts arising from the Sale of Old Ships	13,000	
Machinery for Her Majesty's Ships (Contract)	58,605	
Hulls of Ships building by Contract	9,664	
Guns, Projectiles, Ammunition, Small Arms, &c.	175,057	
Non-Effective Services	3,600	
Miscellaneous Items	1,733	
		501,728
Net Increase	£	25,100

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STATEMENT showing the Total Estimated EXPENDITURE for the NAVAL SERVICE, including Amounts provided in the NAVY ESTIMATES, as well as in the CIVIL SERVICE and other ESTIMATES, for the following Services:—

		1892-93.	1891-92.
NAVY ESTIMATES:		£	£
Estimated Expenditure (after deducting Appropriations in Aid)		14,240,200	14,215,100
CIVIL SERVICE ESTIMATES:			
Estimated Expenditure under—			
Class I. Vote 4.—Admiralty, Extension of Buildings		39,200	50,000
" I. " 9.—Public Buildings, Great Britain:			
Maintenance and Repairs, including New Works, Alterations, &c. . . .	£ 2,570		
Rents, Insurance, Tithes, &c. .	4,200		
Fuel, Light, Water, &c.	3,050		
Furniture . .	1,500		
		11,320	10,900
Class I. Vote 10.—Surveys of the United Kingdom		100	100
" I. " 14.—Rates on Government Property		52,000	52,000
" I. " 15.—Public Buildings, Ireland:			
Coast Guard, viz.:			
New Works and Alterations .	£ 4,180		
Maintenance and Supplies . .	5,077		
Furniture, Fittings, &c.	250		
	£9,507		
Naval Reserve .	3,703		
Semaphores . .	1,180		
		14,390	20,623
Class II. Vote 13.—Exchequer and Audit Department (Cost of Audit):	£		
Navy Cash Account .	5,597		
Store, Expense, and Manufacturing Accounts . .	10,222		
		15,819	15,192
Class II. Vote 23.—Stationery and Printing . .		54,000	50,800
" III. " 1.—Law Charges, England (Net) .		3,172	2,808
" III. " 8.—Prisons, England:			
Maintenance of Naval Prisoners		1,238	1,249
" III. " 14.—Prisons, Scotland . . .		45	50
" III. " 21.—Prisons, Ireland . . .		60	56
REVENUE DEPARTMENTS:	£		
Post Office.—Postage of Official Correspondence	12,095		
" Official Telegrams . .	3,200		
Telegraph Vote.—Extensions to Coast Stations	4,000		
		19,295	15,880
GREENWICH HOSPITAL FUNDS*		..	3,173
Total . . . . . £		14,450,839	14,437,931

* Provision transferred to Navy Estimates.

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VOTE 8.

SHIPBUILDING, REPAIRS, MAINTENANCE, &c.

I.—ESTIMATE of the SUM which will be required in the YEAR ending 31st March, 1893, to defray the EXPENSES of SHIPBUILDING, REPAIRS, MAINTENANCE, &c., including the COST of ESTABLISHMENTS of DOCKYARDS and NAVAL YARDS at HOME and ABROAD.

DOCKYARD WORK.

SECTION I.—PERSONNEL.—One Million Eight Hundred and Sixty-six Thousand one Hundred Pounds.

(£1,866,100.)

SECTION II.—MATÉRIEL.—One Million Six Hundred and Fifteen Thousand Five Hundred Pounds.

(£1,615,500.)

CONTRACT WORK.

SECTION III.—CONTRACT WORK.—One Million Two Hundred and Eighty-nine Thousand Four Hundred Pounds.

(£1,289,400.)

II.—SUB-HEADS under which SECTION I., PERSONNEL, of this VOTE will be accounted for.

	ESTIMATES.		Increase.	Decrease.
	1892-93.	1891-92.		
	£	£	£	£
DOCKYARD WORK.				
SECTION I.—PERSONNEL.				
Dockyards at Home.				
A.—Salaries and Allowances . . .	158,145*	157,333	812	..
B.—Wages, &c., of Men, and hire of Teams	1,472,591	1,375,973	96,618	..
C.—Wages, &c., of Police Force . .	38,180	38,091	89	..
D.—Contingencies	4,575	4,300	275	..
Naval Yards Abroad.				
E.—Salaries and Allowances . . .	51,245*	49,879	1,366	..
F.—Wages, &c., of Men, and hire of Teams	158,657	149,371	9,286	..
G.—Wages, &c., of Police Force . .	11,952	11,596	356	..
H.—Contingencies	967	877	90	..
£	1,896,312	1,787,420	108,892	..
Deduct,—			*Add,—*	
I.—Appropriations in Aid . . .	30,212	35,620	5,408	..
£	1,866,100	1,751,800	114,300	..
	Net Increase . £114,300†			

* These amounts include the sums of £14,364 and £1,308 for pay of Inspectors of Shipwrights at Home and Abroad respectively, which is charged direct to the cost of shipbuilding.

† The Vote, as compared with that for 1891-92, is decreased by £390, £1,200, and £18,173, transferred to Votes 2, 5, and 9 respectively, and increased by £1,170 transferred from Vote 2. The real increase is, therefore, £132,893.

NOTE.—Provision has been made for New Construction under the Naval Defence Act, 1889, to the extent of—

Section 1	£865,150
" 2	492,300
" 3	860,021
	£2,217,471

In addition to the foregoing provision a further sum of £75,000, savings in previous years, will, it is expected, be available for cash expenditure in 1892-23.

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VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION II., MATÉRIEL, of this Vote will be accounted for.

	ESTIMATES.		Increase.	Decrease.
	1892–93.	1891–92.		
	£	£	£	£
DOCKYARD WORK—*continued.*				
SECTION II.—MATÉRIEL.				
Naval Stores.				
A.—Timber, Masts, Deals, &c. . .	106,000	113,600	..	7,600
B.—Metals and Metal Articles . .	548,639	867,929	..	319,290
C.—Coals for Yard purposes . . .	63,000	62,000	1,000	..
D.—Hemp, Canvas, &c.	102,600	100,000	2,600	..
E.—Paint materials, Oils, Pitch, Tar, Tallow, Boats, Furniture, and other Miscellaneous Articles. . .	344,910	300,000	44,910	..
F.—Electrical, Torpedo, and other Apparatus	110,000	70,000	40,000	..
G.—Coals for Steam Vessels . . .	532,000	517,000	15,000	..
H.—Freight.	28,000	28,000	..	..
I.—Rents, Water, &c., Dockyards at Home, and Naval Yards Abroad . .	9,316	8,986	330	..
K.—Gas, &c., Dockyards at Home, and Naval Yards Abroad . . .	10,035	10,085	..	50
£	1,854,500	2,077,600	103,840	326,940
Deduct,—				
L.—Appropriations in Aid . . .	239,000	214,900	24,100	..
£	1,615,500	1,862,700	79,740	326,940
	Net Decrease . . £247,200*			

* The Vote, as compared with that for 1891–92, is decreased by £3,516, transferred to Vote 9. The real decrease, is, therefore, £243,684.

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VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION III., CONTRACT WORK, of this VOTE will be accounted for.

	ESTIMATES.		Increase.	Decrease.
	1892-93.	1891-92.		
	£	£	£	£
SECTION III.—CONTRACT WORK.				
A.—Propelling Machinery for Her Majesty's Ships and Vessels . .	676,398	749,285	..	72,887
B.—Auxiliary Machinery for Her Majesty's Ships and Vessels . .	74,552	60,270	14,282	..
C.—Hulls of Ships, &c., Building by Contract	63,890	73,554	..	9,664
D.—Purchase of Ships, Vessels, &c. .	..	..	..	..
E.—Repairs and Alterations by Contract of Ships, &c., and their Machinery and Stores	61,900	49,400	12,500	..
F.—Inspection of Contract Work . .	8,500	8,650	..	150
G.—Gun Mountings and Air Compressing Machinery	319,656	251,000	68,656	..
H.—Machinery for Her Majesty's Shore Establishments at Home and Abroad	48,537	47,891	646	..
I.—Royal Reserve of Merchant Cruisers.	60,000	60,350	..	350
J.—Interest on Advances under Naval Defence Act, 1889 . . .	15,567	..	15,567	..
£	1,329,000	1,300,400	111,651	83,051
Deduct,—				
K.—Appropriations in Aid . . .	39,600	39,600	..	..
£	1,289,400	1,260,800	111,651	83,051
	Net Increase . .		£28,600	

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VOTE 9.

NAVAL ARMAMENTS.

I.—ESTIMATE of the Sum which will be required in the Year ending the 31st March, 1893, to defray the EXPENSE of NAVAL ARMAMENTS.

One Million Three Hundred and Ninety-eight Thousand Seven Hundred Pounds.
(£1,398,700.)

II.—SUB-HEADS under which this VOTE will be accounted for.

	ESTIMATES.		Increase.	Decrease.
	1892-93.	1891-92.		
	£	£	£	£
Naval Ordnance, &c., Establishments at Home and Abroad:—				
A.—Salaries and Allowances	17,240	19,333	..	2,093
B.—Wages of Artificers, &c.	77,486	43,981	33,505	..
C.—Wages of crews of Naval Ordnance Vessels	9,524	5,996	3,528	..
D.—Wages, &c., of Police Force	11,389	8,400	2,989	..
E.—Medical Attendance, Gas, Rents, Water, and Contingencies	2,486	1,100	1,386	..
F.—Guns	475,000	591,500	..	116,500
G.—Projectiles and Ammunition	461,700	477,000	..	15,300
H.—Torpedoes and Gun Cotton	106,000	137,000	..	31,000
I.—Small Arms and Miscellaneous	204,875	231,000	...	26,125
K.—Inspection, &c.	60,000	55,000	5,000	..
L.—Freight and Incidental Charges	23,000	25,000	..	2,000
£	1,448,700	1,595,310	46,408	193,018
Deduct,—				
M.—Appropriations in Aid	50,000	66,610	..	16,610
£	1,398,700	1,528,700	46,408	176,408
	Net Decrease			£130,000*

* The Vote for 1892-93 is increased by the sums of £650 and £21,689 transferred from Votes 1 and 8 respectively, and decreased by the sum of £6,924 transferred to Vote 12. The real decrease is, therefore, £145,415.

The sum of £300,000 has been provided in this Estimate for the Armament of Dockyard-Built Vessels, under Sec. 1 (3) (*b*) of the Naval Defence Act of 1889. In addition to this sum there is unexpended, to 31st March, 1891, a sum of £448,426, and a further saving is anticipated in 1891-92 of £120,000, both of which amounts are available to meet Expenditure in 1892-93 under the Act.

This Vote does not provide for the Armament of the Vessels building by Contract under Sec. 1 (3) (*a*) of the Naval Defence Act, the Estimated Expenditure on which, for the year 1892-93, will be £450,000, provided out of the Consolidated Fund.

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V.

1892–93.

PROGRAMME OF WORKS IN PROGRESS ON SHIPS BUILDING, &c., IN HER MAJESTY'S DOCKYARDS AND BY CONTRACT.

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V.—PROGRAMME of

PROGRAMME of the ESTIMATED EXPENDITURE in CASH, and in NET
REPAIRS, MAINTENANCE, &c.,
SUB-HEADS under which this ESTIMATED EXPENDITURE will be
provisions of Sec. 1 (2), ARMY

	ESTIMATES,				
	Direct Expenditure.				
	Dockyard Work.		Contract Work, Sec. III.	Total.	Under Section I. (3), of Naval Defence Act (1889.)†
	Personnel, Sec. I.	Matériel, Sec. II.			
NEW CONSTRUCTION:	£	£	£	£	£
Dockyard-Built Ships:					
Old Programme (Naval Defence Act, Sec. 3 (1)) . . .	..	..	44,560	44,560	..
New Programme (Naval Defence Act, Sec. 1 (3) (*b*)) . .	798,980	589,890	760,887	2,149,757	..
Contract-Built Ships:					
Old Programme (Naval Defence Act, Sec. 3 (1)) . . .	8,500	6,900	16,434	31,834	..
New Programme (Naval Defence Act, Sec. 1 (3) (*b*)), (Fitting and Equipping at Dockyards)	41,370	42,510	*38,140	122,020	..
A.—TOTAL	**848,850**	**639,300**	**860,021**	**2,348,171**	..
Contract-Built Ships:					
B.—New Programme (Naval Defence Act, Sec. 1 (3) (*a*)) . . .	..	..	..	..	1,969,428
TOTAL NEW CONSTRUCTION UNDER NAVAL DEFENCE ACT . . .	**848,850**	**639,300**	**860,021**	**2,348,171**	**1,969,428**
C.—NEW VESSELS NOT INCLUDED IN ABOVE, AND TORPEDO AND STEAM BOATS, YARD CRAFT, &c.:					
Dockyard-Built:					
New Battleships . . .	10,500	30,000	..	40,500	..
Small Vessels, &c. . . .	1,240	760	..	2,000	..
Contract-Built:					
New Battleships . . .	..	..	10,000	10,000	..
Small Vessels, &c. (including 10 First-class Torpedo-boats). .	1,600	1,250	39,800	42,650	..
TOTAL . . .	**13,340**	**32,010**	**49,800**	**95,150**	..
TOTAL—NEW CONSTRUCTION	**862,190**	**671,310**	**909,821**	**2,443,321**	**1,969,428**
D.—RE-CONSTRUCTION, REPAIRS, ALTERATIONS, &c. . . .	..	..	..	901,223	..
E.—SEA STORES, COALS, &c. .	..	..	..	887,939	..
F.—ESTABLISHMENT, INCIDENTAL, AND MISCELLANEOUS CHARGES, UNAPPROPRIATED .	..	..	..	..	..
			£	**4,232,483**	**1,969,428**

* Steamboats for Ships building under the Naval Defence Act.

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VALUES OF STORES issued for SHIPBUILDING, RE-CONSTRUCTION, in the Year 1892–93.

accounted for in the NAVY EXPENSE ACCOUNTS, under the AND NAVY AUDIT ACT, 1889.

1892–93.			1891–92.			Difference between Direct Expenditure, 1891–92 (B) and 1892–93. (A)	
Total Direct Expenditure. (A)	Establishment, &c. Charges, apportioned.	Aggregate, 1892–93.	Direct Expenditure. (B)	Establishment, &c. Charges, apportioned.	Aggregate, 1891–92.	Increase.	Decrease.
£	£	£	£	£	£	£	£
44,560	745	45,305	103,807	8,230	112,037	..	59,247
2,149,757	221,143	2,370,900	2,579,104	227,624	2,806,728	..	429,347
31,834	1,998	33,832	91,326	3,751	95,077	..	59,492
122,020	12,793	134,813	154,936	16,956	171,892	..	32,916
2,348,171	**236,679**	**2,584,850**					
1,969,428	..	1,969,428	3,140,733	..	3,140,733	..	1,171,305
4,317,599	**236,679**	**4,554,278**	**6,069,906**	**256,561**	**6,326,467**		
40,500	3,955	44,455	..	..	..	40,500	..
2,000	..	2,000	3,660	..	3,660	..	1,660
10,000	167	10,167	..	..	..	10,000	..
42,650	1,102	43,752	20,510	723	21,233	22,140	..
95,150	**5,224**	**100,374**	**24,170**	**723**	**24,893**		
4,412,749	**241,903**	**4,654,652**	**6,094,076**	**257,284**	**6,351,360**	..	**1,681,327** (Net.)
901,223	91,519	992,742	716,406	73,006	789,412	184,817	..
887,939	40,856	928,795	837,900	34,847	872,747	50,039	..
..	953,826	953,826	..	912,441	912,441	..	..
6,201,911	**1,338,104**	**7,530,015**	**7,648,382**	**1,277,578**	**8,925,960**		

NET DECREASE ON DIRECT EXPENDITURE . . £1,446,471.

† Excluding Guns, Torpedoes, and Ammunition.

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SHIPBUILDING, RE-CONSTRUCTION, REPAIRS, MAINTENANCE, &c., ESTIMATED EXPENDITURE.

STATEMENT showing the Estimated Distribution of the Aggregate Expenditure in Cash and in Net Values of Stores to be issued from Stock, including Establishment and Incidental Charges, in connection with the Programme of Naval Construction, Re-construction, Repairs, and Miscellaneous Services, arranged under the Sub-Heads, &c., under which the Expenditure will be accounted for in the Navy Expense Accounts, under the provisions of Sec. 1 (2), Army and Navy Audit Act, 1889.

SECTION I.—PERSONNEL. HEADS OF EXPENDITURE.	ESTIMATED EXPENDITURE. Charged direct as Incurred. (a.)	Establishment and Incidental Charges Apportioned. (b.)	ESTIMATED DISTRIBUTION OF THE DIRECT AND INCIDENTAL EXPENDITURE. Naval Construction. New Construction. (c.)	Re-construction, Repairs, Alterations, and Refits. Ships Re-constructing. (d.)	Ships for Reliefs or Re-commission. (e.)	Ships in Commission and Reserve. (f.)	Stores for Ships, Coals for Steaming, &c. (g.)	Manufactures (including Repairs). Gun Mountings, Torpedo Carriages, Gear, &c. (h.)	Naval Stores, &c. (i.)	Establishment and Incidental Charges Unapportioned to Ships, &c. Fleet, Port, National and Unappropriated Charges. (k.)	Unappropriated (Haulbowline, Deptford, and Naval Yards Abroad). (l.)	Total Amount of Estimated Expenditure. (m.)
DOCKYARD WORK.	£	£	£	£	£	£	£	£	£	£	£	£
SALARIES OF THE DEPARTMENT OF THE CONTROLLER OF THE NAVY (Vote 12) proportion of, attributable to Dockyard Work	..	30,892	12,037	998	1,101	2,094	1,995	..	291	7,486	4,890	30,892
PENSIONS (Vote 15) ditto ditto	..	6,039	1,204	100	110	209	200	..	29	3,698	489	6,039
TOTAL, ADMIRALTY £	..	36,931	13,241	1,098	1,211	2,303	2,195	..	320	11,184	5,379	36,931
DOCKYARDS AT HOME.												
SALARIES AND ALLOWANCES (Vote 8, Sec. 1, Sub-Head A.), Exclusive of Pay of Inspectors, £15,689 (*)	..	142,456	61,192	5,774	6,283	11,984	8,326	57	3,056	41,762	4,022	142,456
EMOLUMENTS PAID OUT OF OTHER VOTES	..	2,268	..	..	..	..	..	..	..	2,268	..	2,268
PENSIONS OF OFFICERS ON THE RETIRED LIST (Vote 15)	..	41,428	6,119	577	628	1,198	833	6	306	31,359	402	41,428
WAGES, &c., OF MEN AND HIRE OF TEAMS:—												
Upon Ships, &c. Construction, Re-construction, Maintenance, &c.	1,151,400	1,151,400	..	825,850	85,500	85,500	154,550	..	..	..	..	
Upon Ships, &c. New Propelling and other Machinery	38,900	38,900	..	35,100	3,800	..	..	..	..	..	..	
Upon Tugs and Yard Craft Maintenance	7,091	7,091	..	..	..	..	7,091	..	..	..	..	
Upon Tugs and Yard Craft Pay, &c. of Crews	22,103	..	22,103	..	..	..	..	..	..	..	..	
Upon *Manufactures*	59,750	59,750	..	..	..	..	..	..	..	22,103	..	
Upon Yard Services	72,333	..	72,333	12,133	1,165	1,239	2,360	1,415	1,079	58,671	..	
Upon Storekeeping	68,915	..	68,915	21,384	1,514	2,376	4,625	17,101	12	644	52,413	952
Upon Yard Machinery, New, Dockyards	3,982	..	3,982	1,623	166	161	306	31	2	88	15,730	6,095
Upon Yard Machinery, New, Victualling Yards, Naval Ordnance Depots, &c.	761	..	761	..	..	..	..	..	2	106	1,557	30
Upon Yard Machinery, Repairs, Dockyards	28,280	..	28,280	11,510	1,179	1,147	2,171	213	..	..	761	..
Upon Yard Machinery, Repairs, Victualling Yards, Naval Ordnance Depots, &c.	2,665	..	2,665	..	..	..	..	..	14	756	11,090	200
Upon Experiments	5,100	..	5,100	..	..	..	..	..	..	..	2,665	..
Total, inclusive of Pay of Inspectors £	1,461,280(†)										5,100	..
												1,461,280

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CIVIL PENSIONS OF WORKMEN (Vote 15)		..	140,505	33,556	3,481	3,333	6,299	..	43	2,288	91,345	160	140,505
MEDICINES, &c. (Vote 3)		..	275	178	18	18	34	..	..	12	10	5	275
WAGES, &c., OF POLICE FORCE (Vote 8, Sec. 1, Sub-Head C.)		..	38,180	..	..	..	..	..	..	..	37,896	284	38,180
PENSIONS OF POLICE FORCE (Vote 15)		..	3,960	..	..	..	..	..	..	..	3,960	..	3,960
CONTINGENCIES, DOCKYARDS AT HOME (Vote 8, Sec. 1, Sub-Head D.)		..	4,575	1,698	150	178	342	372	1	66	1,603	165	4,575
TOTAL, DOCKYARDS AT HOME	£	1,257,141	577,786	1,010,343	103,394	100,863	190,960	28,291	1,216	65,993	321,622	12,315	1,834,927
NAVAL YARDS ABROAD.													
SALARIES AND ALLOWANCES (Vote 8, Sec. 1, Sub-Head E.), Exclusive of Pay of Inspectors, £1,308 (*)		..	49,937	..	..	..	..	..	..	..	..	49,937	49,937
EMOLUMENTS PAID OUT OF OTHER VOTES		..	681	..	..	..	..	..	..	..	..	681	681
PENSIONS OF OFFICERS ON THE RETIRED LIST (Vote 15)		..	6,392	..	..	..	..	..	..	..	..	6,392	6,392
WAGES, &c., OF MEN AND HIRE OF TEAMS:—	£												
Upon: Ships, &c.—Construction, Maintenance, &c.	77,749	77,749	..	1,240	..	29,880	46,629	..	..	..	..	..	157,120
Upon: Tugs and Yard Craft: Maintenance	5,710	5,710	..	..	..	..	5,710	..	..	..	..	..	
Upon: Tugs and Yard Craft: Pay, &c., of Crews	7,538	..	7,538	..	..	..	..	..	..	..	..	7,538	
Upon: *Manufactures*	7,004	7,004	..	..	..	..	..	..	..	7,004	..	..	
Upon: Yard Services	19,191	..	19,191	..	..	..	..	..	..	..	..	19,191	
Upon: Storekeeping	25,420	..	25,420	..	..	..	..	..	..	..	..	25,420	
Upon: Yard Machinery: New	1,578	..	1,578	..	..	..	..	..	..	..	..	1,578	
Upon: Yard Machinery: Repairs	12,930	..	12,930	..	..	..	..	..	..	..	..	12,930	
Total, inclusive of Pay of Inspectors	£157,120(†)												
CIVIL PENSIONS OF WORKMEN, &c. (Vote 15)		..	4,392	..	..	..	..	..	..	..	..	4,392	4,392
MEDICINES, &c. (Vote 3)		..	42	..	..	..	..	..	..	..	..	42	42
WAGES, &c., OF POLICE FORCE (Vote 8, Sec. 1, Sub-Head G.)		..	11,952	..	..	..	..	..	..	..	..	11,952	11,952
PENSIONS OF POLICE FORCE (Vote 15)		..	44	..	..	..	..	..	..	..	..	44	44
CONTINGENCIES (Vote 8, Sec. 1, Sub-Head H.)		..	967	..	..	..	..	..	..	..	..	967	967
TOTAL, NAVAL YARDS ABROAD	£	90,463	141,064	1,240	..	29,880	52,339	..	..	7,004	..	141,064	231,527
TOTAL YARDS AT HOME AND ABROAD, &c.	£	1,347,604	755,781	1,024,824	104,422	131,954	245,602	30,486	1,216	73,317	332,806	158,758	2,103,385
Deduct,— Value of Labour expended upon the Manufacture of Stores, and included in the issuing prices thereof under "Matériel" (Section 2)		*66,754*	..	..	..	..	..	..	*1,079*	*65,675*	..	..	*66,754*
TOTAL, carried to **RECAPITULATION,** p. 410	£	1,280,850	755,781	1,024,824	104,422	131,954	245,602	30,486	137‡	7,642‡	332,806§	158,758	2,036,631

* Pay of Inspectors of Shipwrights included in the "Wages, &c., of Men, &c.," and distributed as direct charges.
† Exclusive of Expenditure for Indian and Colonial Governments, &c., on repayment as incurred.
‡ Proportion of Establishment, &c., Charges incidental to Manufactures which cannot be included in the issuing prices, *vide* Sec. 6 (1) of Naval Defence Act.
§ The Indirect Expenditure appertaining to Ships constructing by Contract under the Naval Defence Act is included under the "Unappropriated Charges."

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ESTIMATED EXPENDITURE—*continued.*

SECTION II.—MATÉRIEL.

HEADS OF EXPENDITURE.				ESTIMATED EXPENDITURE. Charged direct as Incurred. (a.)	Establishment and Incidental Charges Apportioned. (b.)
DOCKYARD WORK.					
DOCKYARDS AT HOME.					
NAVAL STORES, &c., TO BE WITHDRAWN FROM STOCK (NET):—					
			£	£	£
For Supplies to and Work upon	Ships, &c.	Construction, Re-construction, Maintenance, &c.	1,047,418	1,047,418	..
		New Propelling and other Machinery	21,400	21,400	..
		Coals for Steaming	79,160	79,160	..
	Tugs and Yard Craft, Maintenance		7,330	7,330	..
	Yard Services		29,597	..	29,597
	Storekeeping		23,452	..	23,452
	Yard Machinery	New: Dockyards	3,590	..	3,590
		New: Victualling Yards, Naval Ordnance Depots, &c.	355	..	355
		Repairs: Dockyards	10,515	..	10,515
		Repairs: Victualling Yards, Naval Ordnance Depots, &c.	1,141	..	1,141
	Experiments		6,850	..	6,850
	Total		£ 1,230,808*		
FREIGHT, &c. (Vote 8, Sec. 2, Sub-Head H.)				..	5,400
RENTS, WATER, &c. (Vote 8, Sec. 2, Sub-Head I.)				..	7,445
GAS, &c. (Vote 8, Sec. 2, Sub-Head K.)				..	9,850
BUILDINGS, DOCKS, &c., New Works and Maintenance, Vote 10				..	193,898
TOTAL, DOCKYARDS AT HOME (Carried forward).			£	**1,155,308**	**292,093**

* Exclusive of an Estimated Expenditure of £150,160 for other Departments of the Home Government, Indian, Colonial, and Foreign Governments, and Miscellaneous, on repayment; and of Stores to be sold, included in the Appropriations-in-Aid of Vote 8, Section 2.

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Shipbuilding, Re-construction, Repairs, Maintenance, &c.

Section II.—Matériel.

ESTIMATED DISTRIBUTION OF THE DIRECT AND INCIDENTAL EXPENDITURE.									
Naval Construction.				Stores for Ships, Coals for Steaming, &c.	Manufactures (including Repairs).		Establishment and Incidental Charges Unapportioned to Ships, &c.		Total Amount of Estimated Expenditure.
New Construction.	Re-construction, Repairs, Alterations, and Refits.								
	Ships Re-constructing.	Ships for Reliefs or Re-commission.	Ships in Commission and Reserve.		Gun Mountings, Torpedo Carriages, Gear, &c.	Naval Stores, &c.	Fleet, Port, National, and Unappropriated Charges.	Unappropriated Charges (Haulbowline, Deptford, and Naval Yards Abroad).	
(c.)	(d.)	(e.)	(f.)	(g.)	(h.)	(i.)	(k.)	(l.)	(m.)
£	£	£	£	£	£	£	£	£	£
651,450	28,400	50,015	93,240	224,313	..	..	..	..	1,047,418
19,100	2,300	..	..	..	..	..	..	..	21,400
..	..	..	..	79,160	..	..	..	..	79,160
..	..	..	4,280	3,050	..	..	..	..	7,330
3,779	365	386	733	416	3	206	23,028	681	29,597
7,123	639	743	1,424	3,155	5	292	4,367	5,704	23,452
1,467	151	147	278	27	2	97	1,409	12	3,590
..	..	..	..	..	..	..	355	..	355
4,268	438	426	806	79	5	281	4,112	100	10,515
..	..	..	..	..	..	..	1,141	..	1,141
..	..	..	..	..	..	..	6,850	..	6,850
1,671	115	187	364	849	..	..	189	2,025	5,400
2,874	255	300	577	629	2	111	2,697	..	7,445
3,801	337	398	762	833	3	148	3,568	..	9,850
26,540	2,467	2,738	5,229	4,149	23	1,254	145,203	6,295	193,898
722,073	**35,467**	**55,340**	**107,693**	**316,660**	**43**	**2,389**	**192,919**	**14,817**	**1,447,401**

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ESTIMATED EXPENDITURE—*continued.*

SECTION II.—MATÉRIEL.

HEADS OF EXPENDITURE.			ESTIMATED EXPENDITURE. Charged direct as Incurred. (a.)	Establishment and Incidental Charges Appropriated. (b.)
			£	£
TOTAL, DOCKYARDS AT HOME (Brought forward)			1,155,308	292,093
NAVAL YARDS ABROAD, &c.				
NAVAL STORES, &c., TO BE WITHDRAWN FROM STOCK (NET):—		£		
For Supplies to and Work upon	Ships, &c. Construction, Maintenance, &c.	217,440	217,440	..
	Ships, &c. Coals for Steaming	410,840	410,840	..
	Tugs and Yard Craft, Maintenance	4,730	4,730	..
	Yard Services	11,366	..	11,366
	Storekeeping	3,533	..	3,533
	Yard Machinery New	881	..	881
	Yard Machinery Repairs	4,145	..	4,145
Total	£	652,935*		
FREIGHT, &c. (Vote 8, Sec. 2, Sub-Head H.)			..	22,600
RENTS, WATER, &c. (Vote 8, Sec. 2, Sub-Head I.)			..	2,522
GAS, &c. (Vote 8, Sec. 2, Sub-Head K.)			..	951
BUILDINGS, DOCKS, &c., New Works and Maintenance, Vote 10			..	77,162
TOTAL, NAVAL YARDS ABROAD		£	633,010	123,160
TOTAL YARDS AT HOME AND ABROAD		£	1,788,318	415,253
Add,—				
NEW YARD MACHINERY CONTRACT Purchased by Dockyards at Home			..	..
NEW YARD MACHINERY CONTRACT Purchased by Naval Yards Abroad			..	..
TOTAL, carried to **RECAPITULATION,** p. 410		£	1,788,318	415,253

* Exclusive of an Estimated Expenditure of £150,160 for other Departments of the Home Government, Indian, Colonial, and Foreign Governments, and Miscellaneous, on repayment; and of Stores to be sold, included in the Appropriations-in-Aid of Vote 8, Section 2.

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SHIPBUILDING, RE-CONSTRUCTION, REPAIRS, MAINTENANCE, &c.

SECTION II.—MATÉRIEL.

ESTIMATED DISTRIBUTION OF THE DIRECT AND INCIDENTAL EXPENDITURE.

Naval Construction.					Manufactures (including Repairs).		Establishment and Incidental Charges, Unapportioned to Ships, &c.		
	Re-construction, Repairs, Alterations, and Refits.								
New Construction. (c.)	Ships Re-constructing. (d.)	Ships for Reliefs or Re-commission. (e.)	Ships in Commission and Reserve. (f.)	Stores for Ships, Coals for Steaming, &c. (g.)	Gun Mountings, Torpedo Carriages, Gear, &c. (h.)	Naval Stores, &c. (i.)	Fleet, Port, National, and Unappropriated Charges. (k.)	Unappropriated Charges (Haulbowline, Deptford, and Naval Yards Abroad). (l.)	Total Amount of Estimated Expenditure. (m.)
£	£	£	£	£	£	£	£	£	£
722,073	**35,467**	**55,340**	**107,693**	**316,660**	**43**	**2,389**	**192,919**	**14,817**	**1,447,401**
760	..	26,040	40,040	150,600	..	..	..	..	217,440
..	..	..	..	410,840	..	..	..	..	410,840
..	..	..	3,480	1,250	..	..	..	..	4,730
..	..	..	..	..	..	..	..	11,366	11,366
..	..	..	..	..	..	..	..	3,533	3,533
..	..	..	..	..	..	..	..	881	881
..	..	..	..	..	..	..	..	4,145	4,145
..	..	..	..	..	..	..	..	22,600	22,600
..	..	..	..	..	..	..	..	2,522	2,522
..	..	..	..	..	..	..	..	951	951
..	..	..	..	..	..	..	..	77,162	77,162
760	..	**26,040**	**43,520**	**562,690**	..	..	..	**123,160**	**756,170**
722,833	**35,467**	**81,380**	**151,213**	**879,350**	**43**	**2,389**	**192,919**	**137,977**	**2,203,571**
12,549	1,285	1,252	2,370	233	15	824	15,334	831	See Section 3 on following page.
..	..	..	..	..	..	..	..	6,529	
735,382	**36,752**	**82,632**	**153,583**	**879,583**	**58***	**3,213***	**208,253**	**145,337**	**2,203,571**

* Proportion of Establishment, &c., Charges incidental to Manufactures which cannot be included in the Issuing Prices, *vide* Section 6 (1) of Naval Defence Act.

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Shipbuilding, Re-construction, Repairs, Maintenance, &c.

Section III.—Contract Work.

HEADS OF EXPENDITURE.	ESTIMATED EXPENDITURE. Charged direct as Incurred. (a.)	Establishment and Incidental Charges Apportioned. (b.)
CONTRACT WORK.	£	£
SALARIES OF THE DEPARTMENT OF THE CONTROLLER OF THE NAVY (Vote 12), proportion of, attributable to Contract Work . .	..	22,242
PENSIONS (Vote 15) ditto ditto . .	..	2,224
PROPELLING AND OTHER MACHINERY FOR HER MAJESTY'S SHIPS AND VESSELS (Vote 8, Sec. 3, Sub-Head A.)	676,398	..
OTHER (AUXILIARY) MACHINERY, NOT INCLUDED IN THE CONTRACT PRICE OF SHIPS OR PROPELLING MACHINERY . .	57,222*	..
HULLS OF SHIPS, &c., BUILDING BY CONTRACT (Vote 8, Sec. 3, Sub-Head C.)	63,890	..
PURCHASE OF SHIPS, VESSELS, &c. (Vote 8, Sec. 3, Sub-Head D.) .	..	..
REPAIRS AND ALTERATIONS OF SHIPS, &c., THEIR MACHINERY, AND STORES (Vote 8, Sec. 3, Sub-Head E.)	61,900	..
INSPECTION OF CONTRACT WORK (Vote 8, Sec. 3, Sub-Head F.). .	..	8,500
GUN MOUNTINGS AND AIR-COMPRESSING MACHINERY . . .	303,905*	..
YARD MACHINERY FOR HER MAJESTY'S SHORE ESTABLISHMENTS (Vote 8, Sec. 3. Sub-Head H.):		
Dockyards at Home	..	34,693
Naval Yards Abroad	..	6,529
Victualling Yards, Naval Ordnance Depôts, &c.	..	7,315
ROYAL RESERVE OF MERCHANT CRUISERS (Vote 8, Sec. 3, Sub-Head I.)	..	60,000
INTEREST ON ADVANCES UNDER NAVAL DEFENCE ACT, 1889 (Vote 8, Sec. 3, Sub-Head J.)	..	15,567†
TOTAL Section 3 carried to **RECAPITULATION** on p. 410 £	1,163,315	157,070

* Including £23,314 and £110,900, respectively, payments to be made during the Year for Auxiliary Machinery, Hydraulic Mountings, &c., for Specific Ships; and £33,908 and £193,005, value of transferable Auxiliary Machinery, Gun Mountings, &c., to be issued from Store. The cost of altering, &c., transferable Gun Mountings, &c., is included under Sections 1 and 2.

† Interest on sums borrowed by the Lords Commissioners of Her Majesty's Treasury under Section II. of Naval Defence Act, 1889, on account of Ships Building by Contract.

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ESTIMATED EXPENDITURE—*continued.*

SECTION III.—CONTRACT WORK.

ESTIMATED DISTRIBUTION OF THE DIRECT AND INCIDENTAL EXPENDITURE.

Naval Construction.				Stores for Ships, Coals for Steaming, &c.	Establishment and Incidental Charges Unapportioned to Ships, &c.		Total Amount of Estimated Expenditure.
	Re-construction, Repairs, Alterations, and Refits.						
New Construction. (c.)	Ships Re-constructing. (d.)	Ships for Reliefs or Re-commission. (e.)	Ships in Commission and Reserve. (f.)	(g.)	Fleet, Port, National, and Unappropriated Charges. (h.)	Unappropriated Charges (Haulbowline, Deptford, and Naval Yards Abroad). (i.)	(k.)
£	£	£	£	£	£	£	£
7,674	545	..	623	..	13,400‡	..	22,242
767	55	..	62	..	1,340‡	..	2,224
573,680	102,718	..	..	..	..	..	676,398
37,436	600	3,763	15,423	..	..	..	57,222
63,890	..	..	..	..	..	..	63,890
..	..	..	..	..	..	..	..
..	..	..	61,900	..	..	..	61,900
6,756	878	66	800	..	..	..	8,500
234,815	14,914	5,112	30,338	18,726§	..	..	303,905
For Apportionment, *see* Section II.			..	..	..	..	34,693 6,529
..	..	..	..	..	7,315	..	7,315
..	..	..	..	..	60,000	..	60,000
..	..	..	..	..	15,567†	..	15,567
925,018	**119,710**	**8,941**	**109,146**	**18,726**	**97,622**	..	**1,320,385**

‡ Due to Ships building by Contract under the Naval Defence Act.
§ Estimated value of Supplies to Naval Barracks, Royal Naval Reserve Batteries, and Batteries for Marine Divisions.

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RECAPITULATION OF ESTIMATED EXPENDITURE.

HEADS OF EXPENDITURE.	ESTIMATED EXPENDITURE.		ESTIMATED DISTRIBUTION OF THE DIRECT AND INCIDENTAL EXPENDITURE.							
			Naval Construction.					Establishment and Incidental Charges Unapportioned to Ships, &c.		
				Re-construction, Repairs, Alterations, and Refits.						
	Charged direct as Incurred.	Establishment and Incidental Charges Apportioned.	New Construction.	Ships Re-constructing.	Ships for Reliefs, or Re-commission.	Ships in Commission and Reserve.	Stores for Ships, Coals for Steaming, &c.	Fleet, Port, National, and Unappropriated Charges.	Unappropriated Charges (Haulbowline, Deptford, and Naval Yards Abroad).	Total Amount of Estimated Expenditure.
	(a.)	(b.)	(c.)	(d.)	(e.)	(f.)	(g.)	(h.)	(i.)	(k.)
SUB-HEADS OF EXPENDITURE.			A. and C.	D.			E.	F.		
	£	£	£	£	£	£	£	£	£	£
SECTION I.— DOCKYARD WORK — PERSONNEL	1,280,850	755,781	1,024,824	104,422	131,954	245,602	30,486	332,806 7,779*	158,758	2,036,631
SECTION II.— DOCKYARD WORK — MATERIEL	1,788,318	415,253	735,382	36,752	82,632	153,583	879,583	208,253 3,271*	145,337	2,203,571
SECTION III.—CONTRACT WORK	1,163,315	157,070	925,018	119,710	8,941	109,146	18,726	97,622	..	1,320,385
TOTAL ESTIMATED EXPENDITURE for 1892-93 £	4,232,483	1,328,104	2,685,224	260,884	223,527	508,331	928,795	649,731	304,095	5,560,587
TOTALS OF SUB-HEADS £	5,560,587		2,685,224	992,742			928,795	953,826		5,560,587
Add,—B. NEW CONSTRUCTION, by Contract, provided for under Naval Defence Act, Section 1 (3) (*a*)			1,969,428							
TOTAL NEW CONSTRUCTION £			4,654,652							

* Proportion of Establishment, &c., Charges incidental to Manufactures, which cannot be included in the Issuing Prices, *vide* Section 6 (1) of Naval Defence Act.

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VI.

NEW CONSTRUCTION.

CUMULATIVE EXPENDITURE TO 31ST MARCH, 1891.

ESTIMATED EXPENDITURE IN 1891-92 AND 1892-93.

ESTIMATED CUMULATIVE EXPENDITURE TO 31st MARCH, 1893.

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NEW CONSTRUCTION.—STATEMENT showing CUMULATIVE EXPENDITURE to 31st ESTIMATED EXPENDITURE for 1892–93; and ESTIMATED

	ACTUAL EXPENDITURE on NEW PROGRAMME to 31st March, 1891 (as per Expense Accounts).				
	Charged Direct.				Proportion of Establishment, &c., Charges.
	Dockyard Work.		Contract Work.	Total.	
	Labour.	Materials.			
DOCKYARD-BUILT SHIPS:	£	£	£	£	£
Old Programme (Naval Defence Act, Sect. 3 (1))	..	..	..	..	..
New Programme (Naval Defence Act, Sect. 1 (3)(*b*))	862,530	1,641,588	903,853	(*a*) 3,407,971	297,391
CONTRACT-BUILT SHIPS:					
Old Programme (Naval Defence Act, Sect. 3 (1))	..	..	..	..	..
New Programme (Naval Defence Act, Sect. 1 (3)(*b*)) (Surveying, Equipping, and Completing in Dockyards)	3,817	26,090	3,184	33,091	2,657
A.—TOTAL	..	..	..	..	..
CONTRACT-BUILT SHIPS:					
B.—New Programme (Naval Defence Act, Sect. 1 (3) (*a*))	..	..	3,198,403	3,198,403	..
TOTAL NEW CONSTRUCTION UNDER NAVAL DEFENCE ACT . . .	..	..	..	..	..
C.—NEW VESSELS NOT INCLUDED IN ABOVE, AND TORPEDO AND STEAM BOATS, YARD CRAFT, &c.:					
Dockyard-Built:					
New Battleships	..	..	..	..	..
Small Vessels, &c.	..	..	..	..	..
Contract-Built:					
New Battleship	..	..	..	..	..
Small Vessels, &c.	..	..	..	..	..
GRAND TOTAL—NEW CONSTRUCTION .	866,347	1,667,678	4,105,440	6,639,465	300,048

(*a*) Exclusive of £37,061 (Ships £23,940, and Steamboats £13,121), Expenditure incurred prior to 1st of April, 1889, the date upon which the Naval Defence Act came into operation.

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March, 1891; EXPENDITURE (as Estimated and Probable) in Year 1891–92; TOTAL CUMULATIVE EXPENDITURE to 31st March, 1893.

PROBABLE EXPENDITURE and ESTIMATED BALANCES UNEXPENDED during the Year 1891-92.
(Original Estimates for the Year in *Italics*.)

Charged Direct.				Proportion of Establishment, &c., Charges.	Estimated Balances Unexpended in 1891-92.			
Dockyard Work.		Contract Work.	Total.		Dockyard Work.		Contract Work.	Total.
Labour.	Materials.				Labour.	Materials.		
£	£	£	£	£	£	£	£	£
48,085	31,645	30,523	110,253	12,682				
32,740	*19,535*	*51,532*	*103,807*	*8,230*				
**1,690*			**1,690*					
756,550	965,300	753,119	2,474,969	239,788				
697,260	*1,016,045*	*865,799*	*2,579,104*	*227,624*				
**37,060*			**37,060*					
6,915	5,955	61,849	74,719	3,144				
11,200	*9,000*	*71,126*	*91,326*	*3,751*				
**550*			**550*					
28,450	57,600	†21,709	107,759	10,926				
51,800	*63,840*	*†39,296*	*154,936*	*16,956*				
**2,700*			**2,700*					
					5,000	47,920	160,553	203,473
840,000	1,060,500	867,200	2,767,700					
793,000	*1,108,420*	*1,027,753*	*2,929,173*					
**42,000*			**42,000*					
..	..	2,726,561	2,726,561					
..	..	*3,140,733*	*3,140,733*					
840,000	1,060,500	3,593,761	5,494,261					
793,000	*1,108,420*	*4,168,486*	*6,069,906*					
**42,000*			**42,000*					
..	..	..	..					
..	..	..	..					
2,276	1,083	..	3,359					
2,720	*940*	..	*3,660*					
..	..	..	..					
..	..	..	..					
400	150	9,182	9,732	289				
1,910	*1,600*	*17,000*	*20,510*	*723*				
842,676	**1,061,733**	**3,602,943**	**‡5,507,352**	**266,829**				
797,630	*1,110,960*	*4,185,486*	*6,094,076*	*257,284*				
**42,000*			**42,000*					

* Proportion of the additional sum (£70,000) which was voted to defray the cost of the increase of the Wages of Dockyard Artificers, &c., which has been allocated to New Construction.

† Steamboats for ships building under the Naval Defence Act.

‡ Exclusive of Expenditure (£82,000) upon New Construction under the Imperial Defence Act of 1888.

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NEW CONSTRUCTION.—STATEMENT showing CUMULATIVE EXPENDITURE to 31st ESTIMATED EXPENDITURE for 1892–93; and ESTIMATED

	Estimated Expenditure for the Year 1892–93.				
	Charged Direct.				Proportion of Establishment, &c. Charges.
	Dockyard Work.		Contract Work.	Total.	
	Labour.	Materials.			
	£	£	£	£	£
DOCKYARD-BUILT SHIPS:					
Old Programme (Naval Defence Act, Sect. 3 (1)).	..	..	44,560	44,560	745
New Programme (Naval Defence Act, Sect. 1 (3) (*b*))	798,980	589,890	760,887	2,149,757	221,143
CONTRACT-BUILT SHIPS:					
Old Programme (Naval Defence Act, Sect. 3 (1)).	8,500	6,900	16,434	31,834	1,998
New Programme (Naval Defence Act, Sect. 1 (3) (*b*)) (Surveying, Equipping, and Completing in Dockyards)	41,370	42,510	*38,140	122,020	12,793
TOTAL	848,850	639,300	860,021	2,348,171	236,679
CONTRACT-BUILT SHIPS:					
New Programme (Naval Defence Act, Sect. 1 (3) (*a*))	..	..	1,969,428	1,969,428	..
TOTAL NEW CONSTRUCTION UNDER NAVAL DEFENCE ACT . . .	848,850	639,300	2,829,449	4,317,599	
NEW VESSELS NOT INCLUDED IN ABOVE, AND TORPEDO AND STEAM BOATS, YARD CRAFT, &c.:					
Dockyard-Built:					
New Battleships	10,500	30,000	..	40,500	3,955
Small Vessels, &c.	1,240	760	..	2,000	..
Contract-Built:					
New Battleship	..	..	10,000	10,000	167
Small Vessels, &c.	1,600	1,250	39,800	42,650	1,102
GRAND TOTAL—NEW CONSTRUCTION.	**862,190**	**671,310**	**2,879,249**	**4,412,749**	**241,903**

* Steamboats for ships building under the Naval Defence Act.

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March, 1891; EXPENDITURE (as Estimated and Probable) in Year 1891–92; TOTAL CUMULATIVE EXPENDITURE to 31st March, 1893.

Estimated Total Expenditure on New Programme to 31st March, 1893.					Total Expenditure under Naval Defence Act, excluding Armament and Establishment Charges (New Programme Ships).			
Charged Direct.				Proportion of Establishment, &c. Charges.	Dockyard-Built Ships* (Naval Defence Act, Sect. 1 (3) (b)).		Contract-Built Ships (Naval Defence Act, Sect. 1 (3) (a)).	
Dockyard Work.		Contract Work.	Total.		Probable to 31st March, 1892.	Estimated for 1892–93.	Probable to 31st March, 1892.	Estimated for 1892–93.
Labour.	Materials.							
£	£	£	£	£	£	£	£	£
..	..	..	..	..	..	..	..	..
2,418,060	3,196,778	2,417,859	8,032,697	758,322	5,882,940	2,149,757	..	..
..	..	..	..	..	..	..	..	..
73,637	126,200	63,033	262,870	26,376	*140,850	*122,020	..	..
..	..	..	..	..	..	..	..	..
..	..	7,894,392	7,894,392	..	..	..	5,924,964	1,969,428
..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..
2,491,697	3,322,978	10,375,284	16,189,959	784,698	6,023,790	2,271,777	5,924,964	1,969,428
					£8,295,567		£7,894,392	

* The cost of equipping and completing for sea in Her Majesty's Dockyards the Ships Building by Contract under the Naval Defence Act is included under this Heading.

NOTE.—The Estimated Liability for future years is shown for each Ship in Programme.

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DESCRIPTION OF EXPENDITURE.	ESTIMATED DOCKYARD WORK. Labour to be Expended. Dockyards at Home.	Labour to be Expended. Dockyards Abroad.	Net Value of Materials to be Issued. Dockyards at Home.	Net Value of Materials to be Issued. Dockyards Abroad.
	£	£	£	£
NEW CONSTRUCTION:				
Old Programme:				
Dockyard-built Ships	..	..	..	..
Advances on Gun Mountings for ditto	..	..	..	..
Total Dockyard-built Ships	..	..	..	..
Contract-built Ships	8,500	..	6,900	..
Advances on Gun Mountings for ditto	..	..	..	..
Total Contract-built Ships	8,500	..	6,900	..
Total Old Programme	**8,500**	..	**6,900**	..
New Programme:				
Dockyard-built Ships	798,480	..	589,490	..
Steamboats for ditto	500	..	400	..
Advances on Auxiliary Machinery and Gun Mountings for ditto	..	..	..	..
Total Dockyard-built Ships	798,980	..	589,890	..
Contract-built Ships (Surveying, Equipping, and Completing in Dockyards)	41,370	..	42,510	..
Steamboats for ditto	..	..	..	..
Total Contract-built Ships	41,370	..	42,510	..
Total New Programme	**840,350**	..	**632,400**	..
NEW VESSELS NOT INCLUDED IN ABOVE, AND TORPEDO AND STEAM BOATS, YARD CRAFT, &c.:				
Dockyard-built:				
New Battleships	10,500	..	30,000	..
Small Vessels, &c.	..	1,240	..	760
Contract-built:				
New Battleship	..	..	..	..
Small Vessels, &c.	1,600	..	1,250	..
Total	**12,100**	**1,240**	**31,250**	**760**
RE-CONSTRUCTION	89,300	..	30,700	..
REPAIRS, ALTERATIONS, AND REFITS TO SHIPS FOR RELIEFS OR RE-COMMISSION	85,500	29,880	50,015	26,040
REPAIRS TO SHIPS IN COMMISSION AND RESERVE (including Maintenance of Tug and Yard Craft)	161,641	52,339	97,520	43,520
TOTAL RE-CONSTRUCTION, REPAIRS, &c. (excluding Establishment, &c., Charges)	**336,441**	**82,219**	**178,235**	**69,560**
TOTAL NEW CONSTRUCTION,* RE-CONSTRUCTION, REPAIRS, &c. (excluding Establishment, &c., Charges) (Carried forward).	**1,197,391**	**83,459**	**848,785**	**70,320**

* Exclusive of estimated expenditure upon contract work under Section 1 (3) (*a*) of the Naval Defence Act.

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EXPENDITURE DURING 1892–93.

CONTRACT WORK, &c.								GRAND TOTAL, DOCKYARD AND CONTRACT WORK.
Propelling and other Machinery.		Hulls, &c., Building by Contract.	Purchase of Ships and Vessels.	Repairs, &c., by Contract.	Inspection of Contract Work.	Gun Mountings and Air-compressing Machinery.	TOTAL.	
Vote 8, Section III., Sub-Head A.	Vote 8, Section III., Sub-Head B., &c.							
£	£	£	£	£	£	£	£	£
42,000	..	..	..	..	..	..	42,000	42,000
..	..	..	..	..	..	2,560	2,560	2,560
42,000	..	..	..	..	..	2,560	44,560	44,560
7,411	608	5,500	..	..	..	355	13,874	29,274
..	..	..	..	..	..	2,560	2,560	2,560
7,411	608	5,500	..	..	..	2,915	16,434	31,834
49,411	**608**	**5,500**	..	..	..	**5,475**	**60,994**	**76,394**
455,179	30,974	..	..	..	..	199,562	685,715	2,073,685
22,720	..	16,820	..	..	..	..	39,540	40,440
..	5,854	..	..	..	..	29,778	35,632	35,632
477,899	36,828	16,820	..	..	..	229,340	760,887	2,149,757
..	..	..	..	..	..	..	..	83,880
21,870	..	16,270	..	..	..	..	38,140	38,140
21,870	..	16,270	..	..	..	..	38,140	122,020
499,769	**36,828**	**33,090**	..	..	..	**229,340**	**799,027**	**2,271,777**
..	..	..	..	..	..	..	..	40,500
..	..	..	..	..	..	..	..	2,000
2,500	..	7,500	..	..	..	..	10,000	10,000
22,000	..	17,800	..	..	..	..	39,800	42,650
24,500	..	**25,300**	..	..	..	..	**49,800**	**95,150**
102,718	600	..	..	..	..	14,914	118,232	238,232
..	3,763	..	..	..	..	5,112	8,875	200,310
..	15,423	..	..	61,900	..	30,338	107,661	462,681
102,718	**19,786**	..	..	**61,900**	..	**50,364**	**234,768**	**901,223**
676,398	**57,222**	**63,890**	..	**61,900**	..	**285,179**	**1,144,589**	**3,344,544**

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DESCRIPTION OF EXPENDITURE.	ESTIMATED			
	DOCKYARD WORK.			
	Labour to be Expended.		Net Value of Materials to be Issued.	
	Dockyards at Home.	Dockyards Abroad.	Dockyards at Home.	Dockyards Abroad.
	£	£	£	£
TOTAL NEW CONSTRUCTION,* RE-CONSTRUCTION, REPAIRS, &c. (Brought forward)	1,197,391	83,459	848,785	70,320
SEA STORES FOR SHIPS	..	..	227,363	151,859
COALS FOR STEAMING	..	..	79,160	410,840
TOTAL SEA STORES, &c., &c.	..	..	306,523	562,690
TOTAL DIRECT EXPENDITURE	1,197,391	83,459	1,155,308	633,010
Manufactures	59,750	7,004	..	..
ESTABLISHMENT AND INCIDENTAL CHARGES, LABOUR, MATERIALS, &c.:				
Apportioned to Ships	83,819	..	26,850	..
Apportioned to Manufactures	1,624	..	891	..
Unapportioned	118,696	66,657	47,759	19,925
TOTAL ESTABLISHMENT AND INCIDENTAL CHARGES, LABOUR, MATERIALS, &c.	204,139	66,657	75,500	19,925
GRAND TOTAL—LABOUR, MATERIALS, AND CONTRACT WORK	(a) 1,461,280	(a) 157,120	1,230,808	652,935
Add,— **ESTABLISHMENT AND INCIDENTAL CHARGES, OTHER THAN LABOUR, MATERIALS, &c.:**				
Apportioned to Ships	..	..	..	..
Apportioned to Manufactures	..	..	..	..
Unapportioned	..	..	..	..
Deduct,— Value of Labour to be expended upon Manufacture of Stores included in values of Materials to be issued	..	..	..	..
GRAND TOTAL OF ESTIMATED EXPENDITURE	..	..	..	..

* Exclusive of £1,969,428, the estimated expenditure upon contract work under Section 1 (3) (a) of the Naval Defence Act.

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EXPENDITURE DURING 1892–93.

CONTRACT WORK, &c.								GRAND TOTAL.
Propelling and other Machinery.		Hulls, &c., Building by Contract.	Purchase of Ships and Vessels.	Repairs, &c., by Contract.	Inspection of Contract Work.	Gun Mountings and Air-compressing Machinery.	Total.	
Vote 8, Section III., Sub-Head A.	Vote 8, Section III., Sub-Head B., &c.							
£	£	£	£	£	£	£	£	£
676,398	57,222	63,890	..	61,900	..	285,179	1,144,589	3,344,544
..	..	..	..	..	..	18,726	18,726	..
..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	18,726	18,726	887,939
676,398	57,222	63,890	..	61,900	..	303,905	1,163,315	4,232,483
..	..	..	..	..	..	..	..	66,754
..	..	..	..	..	8,500	..	8,500	..
..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..
..	..	..	..	..	8,500	..	8,500	374,721
676,398	57,222	63,890	..	61,900	8,500	303,905	1,171,815	4,673,958

.. ..	255,109
.. ..	8,535
.. ..	689,739
	5,627,341
.. ..	*66,754*
.. .. £	5,560,587

	Dockyards.	
	At Home.	Abroad.
	£	£
(*a*) Total Vote 8, Sect. 1, Sub-heads B and F. . .	1,472,591	158,657
Add,— Salaries of Inspectors of Shipwrights . .	15,689	1,308
	1,488,280	159,965
Abate,— Additional sums provided in the Vote to meet the difference in the periods covered by the Financial Year 1892–93 and the 53 weekly payments which will fall due in that year .	*27,000*	*2,845*
Total	£1,461,280	157,120

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SUMMARY of SHIPS BUILDING, COMPLETING, and to be Commenced in

CLASS OF SHIP.	PORTSMOUTH.			DEVONPORT.			CHATHAM.			SHEERNESS.		
	To Complete.	To Advance.	To Commence.	To Complete.	To Advance.	To Commence.	To Complete.	To Advance.	To Commence.	To Complete.	To Advance.	To Commence.
OLD PROGRAMME:												
ARMOURED:												
Battleships, 1st Class	..	..	..	..	..	..	..	..	..	..	..	..
Battleships, 2nd Class	..	..	..	..	..	..	..	..	..	..	..	..
Cruisers, 1st Class	..	..	..	..	..	..	..	..	..	..	..	..
Total	..	..	..	..	..	..	..	..	..	..	..	..
PROTECTED:												
Cruisers, 1st Class	..	..	..	..	..	..	1	..	..	..	..	..
Cruisers, 2nd Class	..	..	..	..	..	..	..	..	..	..	..	..
Cruisers, 3rd Class	..	..	..	..	..	..	..	..	..	..	..	..
Torpedo Depôt Ships	..	..	..	..	..	..	..	..	..	..	..	..
Total	..	..	..	..	..	..	1	..	..	..	..	..
UNPROTECTED:												
Torpedo Gunboats, 1st Class	..	..	..	..	..	..	..	..	..	..	..	..
Total	..	..	..	..	..	..	..	..	..	..	..	..
Total Old Programme	..	..	..	..	..	..	1	..	..	..	..	..
NEW PROGRAMME (Naval Defence Act, 1889):												
ARMOURED:												
Battleships, 1st Class	1	1	..	..	..	..	..	2	..	..	..	..
Battleships, 2nd Class	..	1	..	..	..	..	..	1	..	..	..	..
Cruisers, 1st Class	..	..	..	..	..	..	..	..	..	..	..	..
Total	1	2	..	..	..	..	..	3	..	..	..	..
PROTECTED:												
Cruisers, 1st Class	1	4	..	1	..	..	1	2	..	..	..	..
Cruisers, 2nd Class	2	1	..	6	3	..	2	1	..	1	1	..
Cruisers, 3rd Class	..	..	..	..	..	..	..	..	..	..	..	..
Total	3	5	..	7	3	..	3	3	..	1	1	..
UNPROTECTED:												
Torpedo Gunboats, 1st Class	..	..	..	1	1	2	..	..	1	3	†4	..
Total	..	..	..	1	1	2	..	..	1	3	4	..
Total New Programme (Naval Defence Act, 1889)	4	7	..	8	4	2	3	6	1	4	5	..
GRAND TOTAL, Ships Building and Completing	4	7	..	8	4	2	4	6	1	4	5	..

* Includes 5 (Portsmouth, 3; Chatham, 2) 1st Class Cruisers to be advanced after delivery from Contractors.

† Includes 3 Vessels to be advanced after delivery from Contractors.

‡ Includes Repulse, shown as advancing under Portsmouth and also at Pembroke.

§ Exclusive of 3 New Battleships beyond Naval Defence Act, 1889, two to be built at the Dockyards, and one to be built by Contract.

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HER MAJESTY'S DOCKYARDS, and by CONTRACT, during the YEAR 1892–93.

PEMBROKE.			TOTAL IN DOCKYARDS.			BY CONTRACT.			TOTAL IN DOCKYARDS AND BY CONTRACT.			
To Complete.	To Advance.	To Commence.	To Complete.	To Advance.	To Commence.	To Complete.	To Advance.	To Commence.	To Complete.	To Advance.	To Commence.	GRAND TOTAL.
..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	1	..	..	..	..	..	1	..	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	1	..	..	..	..	..	1	..	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	1	..	..	..	..	..	1	..	..	1 **Total Old Programme.**
..	1	..	1	‡4	..	..	4	..	1	7	..	8
..	..	..	..	2	..	..	..	..	..	2	..	2
..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	1	5	..	..	4	..	1	9	..	10
..	..	..	3	*6	..	..	..	..	3	6	..	9
..	2	..	‖11	8	..	..	..	..	11	8	..	19
..	..	..	..	..	..	..	..	..	..	..	..	..
..	2	..	14	14	..	..	..	..	14	14	..	28
..	..	1	4	5	4	3	..	..	7	5	4	16
..	..	1	4	5	4	3	..	..	7	5	4	16
..	3	1	19	24	4	3	4	..	22	28	4	54 **Total New Programme (Naval Defence Act, 1889).**
..	3	1	20	24	4	3	4	..	23	28	4	§55 **TOTAL.**
Ships that will be Completed during 1891–2												16
												¶71 **GRAND TOTAL.**

‖ Includes 9 (Portsmouth, 2; Devonport, 5; Chatham, 2) 2nd Class Cruisers, Contract-built Ships, to be completed.

¶ Includes Blenheim, Old Programme Ship.

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VII.

LIST of NEW SHIPS and VESSELS Estimated to be passed into the FIRST RESERVE during the Years 1892–93 and 1891–92.

1892–93.				1891–92.			
NAME OF SHIP.	Load Displacement in Tons.	Indicated Horse Power.	Number of Guns.	NAME OF SHIP.	Load Displacement in Tons.	Indicated Horse Power.	Number of Guns.
ARMOURED SHIP:				**ARMOURED SHIP:**			
Royal Sovereign . . (Battleship, First Class.)	14,150	13,000	14	Nile. . . (Battleship, First Class.)	11,940	12,000	10
PROTECTED SHIPS:				**PROTECTED SHIPS:**			
Royal Arthur (Cruisers, First Class.)	7,700	12,000	13	Blake . . (Cruiser, First Class.)	9,000	20,000	12
Edgar . . (Cruisers, First Class.)	7,350	12,000	12	Andromache (Cruisers, Second Class.)	3,400	9,000	8
Hawke . . (Cruisers, First Class.)	7,350	12,000	12	Apollo . . (Cruisers, Second Class.)	3,400	9,000	8
Blenheim . (Cruisers, First Class.)	9,000	20,000	12	Indefatigable . (Cruisers, Second Class.)	3,600	9,000	8
Vulcan . . (Torpedo Depôt Ship.)	6,620	12,000	8	Latona . . (Cruisers, Second Class.)	3,400	9,000	8
Æolus . . (Cruisers, Second Class.)	3,600	9,000	8	Melampus . (Cruisers, Second Class.)	3,400	9,000	8
Brilliant . . (Cruisers, Second Class.)	3,600	9,000	8	Naiad . . (Cruisers, Second Class.)	3,400	9,000	8
Intrepid . . (Cruisers, Second Class.)	3,600	9,000	8	Sirius . . (Cruisers, Second Class.)	3,600	9,000	8
Iphigenia . (Cruisers, Second Class.)	3,600	9,000	8	Terpsichore (Cruisers, Second Class.)	3,400	9,000	8
Pique . . (Cruisers, Second Class.)	3,600	9,000	8	Thetis . . (Cruisers, Second Class.)	3,400	9,000	8
Rainbow. . (Cruisers, Second Class.)	3,600	9,000	8	Tribune. . (Cruisers, Second Class.)	3,400	9,000	8
Retribution . (Cruisers, Second Class.)	3,600	9,000	8	Bellona . . (Cruisers, Third Class.)	1,830	6,000	6
Sappho . . (Cruisers, Second Class.)	3,400	9,000	8	Pallas . . (Cruisers, Third Class.)	2,575	7,500	8
Scylla . . (Cruisers, Second Class.)	3,400	9,000	8	Pearl . . (Cruisers, Third Class.)	2,575	7,500	8
Spartan . . (Cruisers, Second Class.)	3,600	9,000	8	Phœbe . . (Cruisers, Third Class.)	2,575	7,500	8
Sybille . . (Cruisers, Second Class.)	3,400	9,000	8	Philomel . (Cruisers, Third Class.)	2,575	7,500	8
Alarm . . (Torpedo Gunboats, First Class.)	810	3,500	2	**UNPROTECTED SHIPS:**			
Antelope . (Torpedo Gunboats, First Class.)	810	3,500	2	Gossamer . (Torpedo Gunboats, First Class.)	735	4,500	2
Circe . . . (Torpedo Gunboats, First Class.)	810	3,500	2	Gleaner . (Torpedo Gunboats, First Class.)	735	4,500	2
Leda . . . (Torpedo Gunboats, First Class.)	810	3,500	2				

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VIII.

A List of Ships Building under Naval Defence Act not to be Completed till after March 31, 1893.

Rate.	Name.	When Laid Down.
	1889.	
1st Class Battleship, Turret . . .	Hood . . .	Aug. 12
1st Class Battleship, Barbette . . .	Ramillies .	—
" "	Empress of India . .	July 9
" "	Repulse . .	May 4
" "	Resolution .	—
" "	Revenge . .	—
" "	Royal Oak .	—
1st Class Cruiser, Protected . . .	Endymion .	—
" "	Gibraltar .	—
" "	Grafton . .	—
" "	St. George .	—
" "	Theseus . .	—
	1890.	
2nd Class Battleship, Barbette . . .	Barfleur . .	—
" "	Centurion .	—
1st Class Cruiser .	Crescent . .	—
2nd Class Cruiser, Protected . . .	Astræa . .	—
" "	Bonaventure	—
	1891.	
2nd Class Cruiser, Protected . .	Cambrian .	—
" "	Charybdis .	—
" "	Flora . . .	—
" "	Forte . . .	—
" "	Fox . . .	—
" "	Hermione .	—
	1891–92.	
1st Class Torpedo Gunboat . . .	Hebe . . .	—
" "	Jaseur . .	—
" "	Jason . . .	—
" "	Niger . . .	—
" "	Onyx . . .	—
" "	Renard . .	—
" "	Speedy . .	—
" " (improved)	Dryad . .	—
" "	Halcyon . .	—
" "	Harrier . .	—
" "	Hazard . .	—
" "	Hussar . .	—

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IX.—STATEMENT showing the COST of the different CLASSES of in each Year to the FLEET, and the

YEAR OF COMPLETION.	Armoured, Protected, and Partially Protected. Depreciation, 4 per cent. per annum for 22 years from date of Completion.	Corvettes, Sloops, Torpedo Cruisers, Gun Vessels, Gunboats, Troop Ships, &c. Depreciation, 6 per cent. per annum for 15 years from date of Completion.
	£	£
First Cost of Ships not included for Depreciation in following Tables	6,143,956	5,258,231
First Cost of Ships completed in 1870-71 . .	782,386	
" " 1871-72 . .	939,092	
" " 1872-73 . .	273,169	
" " 1873-74 . .	847,405	
" " 1874-75 . .	300,767	
" " 1875-76 . .	..	
" " 1876-77 . .	802,030	
" " 1877-78 . .	1,699,854	952,505
" " 1878-79 . .	1,134,012	1,217,857
" " 1879-80 . .	809,139	674,575
" " 1880-81 . .	684,102	320,582
" " 1881-82 . .	2,370,225	284,220
" " 1882-83 . .	755,247	175,555
" " 1883-84 . .	251,322	461,852
" " 1884-85 . .	725,919	374,122
" " 1885-86 . .	2,884,409	
" " 1886-87 . .	2,747,065	624,549
" " 1887-88 . .	6,208,458	1,210,227
" " 1888-89 . .	1,887,244	630,437
" " 1889-90 . .	2,355,187	889,141
" " 1890-91 . .	2,655,072	165,468
" " 1891-92 (a) .	2,683,375	63,798
TOTAL	33,795,479	8,044,888
Add,—Cost of Vessels lost, sold, or broken up, built within above period	634,824	467,751
TOTAL	34,430,303	8,512,639
Estimated Annual Percentage for Depreciation	4 per cent.	6 per cent.
Annual Amount required for Replacement . .	£1,377,212	£510,758

(a) Revised estimated cost.

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VESSELS (including Proportion of INCIDENTAL CHARGES) added
Estimated Annual RATE of DEPRECIATION.

Torpedo Boats, Steam Launches, &c. Depreciation, 9 per cent. per annum for 11 years from date of Completion.	Guard, Receiving, Training, and Harbour Vessels. Depreciation, 4 per cent. per annum for 22 years from date of Completion.	Small Vessels, Tugs, and Yard Craft. Depreciation, 5 per cent. per annum for 18 years from date of Completion.	TOTAL.
£	£	£	£
270,600 (Estimated.)	4,771,819	306,040	16,750,046
	97,844		880,230
	33,371		972,463
	22,722		295,891
	..		847,405
	..	8,338	309,105
	23,910	60,862	84,772
	..	..	802,030
	..	26,567	2,678,926
	68,179	..	2,420,048
	54,036	..	1,537,750
	..	4,368	1,009,052
	..	9,830	
	..	23,920	
	..	71,512	
	..	..	
	..	7,280	
1,606,000 (Estimated.)	..	12,869	32,225,792
	..	9,204	
	..	21,129	
	24,005	..	
	..	14,176	
	..	22,975	
1,606,000	324,067	293,030	44,063,464
21,000 (Estimated.)	..	21,889	1,145,464
1,627,000	324,067	314,919	45,208,928
9 per cent.	4 per cent.	5 per cent.	..
£146,430	£12,963	£15,746	£2,063,109

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X.—STATEMENT showing the Approximate Aggregate COST of the of the Royal Navy, under the years of their

CLASS OF SHIP.	Prior to 1870-71.	1870-1.	1871-2.	1872-3.	1873-4.	1874-5.	1875-6.	1876-7.	1877-8.	1878-9.	1879-80.	1880-1.	1881-2.
1. EFFECTIVE SHIPS:													
COMBATANT:	£	£	£	£	£	£	£	£	£	£	£	£	£
Armoured . .	3,470 217 *518,609*	714,257 *68,129*	399,096 *54,841*	267,718 *5,451*	771,253 *76,152*	239,197 *61,570*	..	682,626 *119,404*	1,461,069 *238,785*	886,918 *119,024*	414,434 *13,374*	531,846 *24,816*	1,912,964 *179,368*
Protected . .	..	..	..	..	..	..	..	..	..	..	..	..	..
Partially protected	..	..	..	..	..	..	..	..	..	123,913 *4,157*	244,499 *8,661*	122,681 *4,759*	123,044 *5,034*
Unprotected, viz.:													
Frigates . . .	226,260 *57,580*	..	..	..	..	210,234 *59,582*	..	..	..	..	..	..	..
Corvettes . . .	132,817 *2,578*	132,102 *2,852*	..	..	..	..	..	103,429 *3,886*	338,835 *44,134*	209,712 *43,831*	224,052 *32,961*	..	..
Sloops . . .	..	..	..	..	..	..	..	..	172,102 *18,207*	57,290 *14,582*	..	..	105,363 *27,036*
Torpedo Depot Ship, and Cruisers . .	..	..	..	..	..	..	..	..	..	126,517 *5,060*	..	..	..
Torpedo Gunboats	..	..	..	..	..	..	..	..	..	..	..	..	..
Gun-Vessels . .	..	..	..	..	..	..	..	..	..	..	..	75,247 *2,715*	..
Gunboats . . .	..	..	..	15,912 *3,898*	..	..	..	..	48,810 *1,566*	48,961 *1,721*	..	23,653 *4,350*	45,214 *1,941*
Gunboats, Coast Defence . . .	6,719 *33*	7,751 *2,388*	88,539 *15,111*	54,059 *5,489*	43,855 *266*	..	..	..	40,714 *3,192*	195,975 *15,739*	47,500 *9,072*	..	23,478 *4,324*
Despatch, Surveying Vessels, &c.	183,433 *51,045*	..	..	..	..	171,434 *40,619*	..	..	..	..	..	102,436 *3,666*	23,570 *733*
Torpedo Boats, Launches, &c. .	..	..	..	..	..	..	..	..	..	..	..	..	..
£	4,019,446 *629,845*	854,110 *73,369*	487,635 *69,952*	337,689 *14,838*	815,108 *76,418*	620,865 *161,771*	..	786,055 *123,290*	2,061,530 *305,884*	1,649,286 *204,114*	930,485 *64,068*	855,863 *40,306*	2,233,633 *218,436*
NON-COMBATANT:													
Troop and Store Ships . . .	382,114 *9,558*	..	..	..	21,500	..	101,625 *2,507*	..	..	123,078 *2,157*	..	..	..
Small Steam Vessels, Tugs, Tanks, &c. . .	244,979 *20,514*	..	..	..	37,798 *2,749*	8,018 *320*	50,521 *10,341*	..	25,546 *1,021*	..	..	4,200 *168*	9,452 *378*
2. NON-EFFECTIVE SHIPS:													
Ships capable of being fitted, but not ordered . .	1,157,427 *36,687*	..	374,777 *110,378*	..	..	..	178,033 *3,559*	..	..	256,235 *50,447*	363,781 *50,606*	..	123,015 *26,800*
Ships unfit for Service, or ordered to be sold, &c. .	2,653,221 *680,139*	..	..	..	42,597 *8,286*	..	189,723 *20,044*	249,974 *54,496*	267,566 *17,379*	53,884 *12,668*	61,949 *12,825*	93,711 *14,804*	46,765 *5,796*
3. GUARD, RECEIVING, &c., SHIPS:													
Guard, Receiving, &c., Ships . .	3,538,319 *1,233,500*	75,993 *21,851*	25,843 *7,528*	16,230 *6,492*	..	..	22,991 *919*	..	..	53,884 *14,295*	38,598 *15,438*	..	..
4. SHIPS NOT COMPLETE:													
Armoured . .	..	..	..	..	..	..	..	..	..	..	..	..	..
Protected . .	..	..	..	..	..	..	..	..	..	..	..	..	..
Unprotected . .	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL . £	11,995,506 *2,610,243*	930,103 *95,220*	888,255 *187,858*	353,919 *21,330*	917,003 *87,453*	628,883 *162,091*	542,893 *37,370*	1,036,029 *177,786*	2,354,642 *324,284*	2,136,367 *283,681*	1,394,813 *142,937*	953,774 *55,278*	2,412,865 *251,410*

NOTE.—The Figures in *Italics* represent the dockyard incidental charges apportioned to each Ship.

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Effective and Non-Effective SHIPS at present on the Strength completion. (Incidental Charges printed in *Italics.*)

1882-3.	1883-4.	1884-5.	1885-6.	1886-7.	1887-8.	1888-9.	1889-90.	1890-1.	1891-2.*	TOTAL First Cost.	Expended to 31st of March, 1892, on Vessels not yet Complete.	Outstanding Liabilities on 1st of April, 1892, on Ships Commenced.
£	£	£	£	£	£	£	£	£	£	£	£	£
296,761	..	530,015	1,210,109	2,227,883	4,991,135	1,191,534	1,513,344	1,540,608	..		..	..
4,696		*104,527*	*206,566*	*319,274*	*471,285*	*136,652*	*92,532*	*73,250*				
226,305	..	..	..	..	638,271	496,193	688,640	997,725	2,555,235	33,286,557	..	..
49,476					*107,767*	*62,865*	*60,671*	*43,489*	*128,140*	*3,643,208*		
68,056	204,775	73,644	1,279,454	191,138	..	..	..	..	..		..	..
18,554	*46,547*	*17,733*	*188,280*	*8,770*								
..	..	..	..	..	..	..	..	..	..	436,494	..	..
										117,162		
..	234,860	..	..	..	..	..	..	..	..		..	..
	34,446											
..	53,871	162,726	..	180,246	64,409	170,227	112,489	..	..		..	..
	13,824	*27,983*		*30,205*	*16,069*	*32,186*	*16,182*					
..	..	..	..	96,462	690,230	..	..	..	..		..	..
				4,781	*48,474*							
..	..	..	..	..	151,345	53,480	322,953	51,484	52,302		..	..
					23,942	*7,532*	*36,541*	*11,440*	*11,496*	6,838,979		
..	..	..	..	114,033	..	..	..	..	..	*829,756*	..	..
				25,365								
69,936	32,783	65,584	..	..	141,815	240,413	355,915	100,158	..		..	..
6,692	*1,262*	*2,870*			*3,798*	*42,132*	*45,061*	*2,386*				
..	..	..	..	..	..	..	..	..	..		..	..
71,766	88,037	..	..	167,178	67,478	77,320	..	..	..		..	..
3,232	*2,769*			*6,279*	*3,667*	*7,147*						
..	..	..	..	..	..	..	..	..	..	1,876,000	..	..
732,824	614,326	831,969	2,489,563	2,976,940	6,744,683	2,229,167	2,993,341	2,689,975	2,607,537	40,562,030	..	..
82,650	*98,848*	*153,113*	*394,846*	*394,674*	*674,002*	*288,514*	*250,987*	*130,565*	*139,636*	*4,590,126*		
										1,876,000		
..	..	..	..	..	..	..	..	..	..	628,317	..	..
										14,222		
23,000	68,763	..	7,000	12,727	8,187	20,650	..	13,865	22,772	557,478	..	..
920	*2,749*		*280*	*142*	*1,017*	*479*		*311*	*203*	*41,592*		
95,222	..	101,284	..	..	..	..	..	..	..		..	..
20,106		*13,675*										
										6,309,164		
..	..	..	..	..	..	..	..	..	..	*1,138,695*	..	..
..	..	..	..	..	..	..	21,025	..	..	3,792,883	..	..
							2,980			*1,303,003*		
..	..	..	..	..	..	..	..	..	..	..	4,803,446	2,916,604
											211,702	*155,018*
..	..	..	..	..	..	..	..	..	..	..	4,923,539	2,513,708
											233,887	*213,889*
..	..	..	..	..	..	..	..	..	..	..	228,128	426,715
											19,330	*29,500*
											†	‡
851,046	683,089	933,253	2,496,563	2,989,667	6,752,870	2,249,817	3,014,366	2,703,840	2,630,309	51,849,872	9,955,113	§5,856,427
103,676	*101,597*	*166,788*	*395,126*	*394,816*	*675,019*	*288,993*	*253,967*	*130,876*	*139,839*	*7,087,638*	*464,919*	*§398,407*
										1,876,000		

* The figures for this year represent the revised estimated cost of the vessels to be completed.
† Includes expenditure, &c., upon ships building by contract under the "Naval Defence Act."
‡ Includes outstanding liabilities upon ships building by contract under the "Naval Defence Act."
§ These amounts are exclusive of the outstanding liabilities for Machinery, &c., on the 1st April, 1892, upon ships where details of Estimates are not yet completed.

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XI.

Comparative Tables of British, French, and Russian Ships, as given in the 'Naval Annual' for 1888-89, and subsequent volumes, and now brought up to present date.

TABLE I.—FIRST-CLASS BATTLESHIPS.

ENGLAND.			FRANCE.			RUSSIA.		
Date.	Name.	Displacement.	Date.	Name.	Displacement.	Date.	Name.	Displacement.
		Tons.			Tons.			Tons.
1883	Agamemnon	8,660	1883	Amiral Baudin	11,380	1886	Catherine II.	10,150
1883	Ajax	8,660	1879	Amiral Duperré	11,100	Complg.	Dvenadsat Apostoloff ..	8,076
1877	Alexandra	9,490	Bldg.	Brennus	10,983	Bldg.	Gheorghy Pobyedonosets	10,280
1889	Anson	10,600	Bldg.	Charles Martel	11,882	1872	Peter the Great	8,749
Bldg.	Barfleur	10,500	1881	Courbet	9,700	1887	Sinope	10,181
1888	Benbow	10,600	1879	Dévastation	10,100	1886	Tchesmé	10,181
1889	Camperdown	10,600	1885	Formidable	11,441	Bldg.	Tri Sviatiteli (Three Saints)	12,480
Bldg.	Centurion	10,500	1886	Hoche	10,650	Bldg.	Lizoi Veliky	8,880
1886	Collingwood	9,500	Bldg.	Jauréguibery	11,818	Bldg.	Petropaulosk	10,960
1886	Colossus	9,420	Bldg.	Lazare Carnot	11,986	Bldg.	Poltava	10,960
1873	Devastation	9,330	1890	Magenta	10,581	Bldg.	Sevastopol	10,960
1875	Dreadnought	10,820	1887	Marceau	10,581			
1886	Edinburgh	9,420	Bldg.	Masséna	11,700			
Com-pleting.	Empress of India (was Re-nown)	14,150	1887	Neptune	10,581			
			1876	Redoutable	8,860			

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Compling.	Hood	14,150	Bldg.	A new ship	11,700			
1887	Howe	10,300						
1881	Inflexible	11,880						
1878	Neptune	9,380						
1890	Nile	11,940						
Compling.	Ramillies	14,150						
Compling.	Repulse	14,150						
Bldg.	Resolution	14,150						
Bldg.	Revenge	14,150						
1887	Rodney	10,300						
Bldg.	Royal Oak	14,150						
1892	Royal Sovereign	14,150						
1889	Sanspareil	10,470						
1880	Superb	9,170						
1877	Téméraire	8,540						
1877	Thunderer	9,330						
1887	Trafalgar	11,940						
1889	Victoria	10,470						
Bldg.	3 new first-class battleships of the New Programme, 1892–93	..						
	Total 35 Ships	354,950(*a*)		Total 16 Ships	175,043		Total 11 Ships.. ..	111,857

(*a*) To this must be added, say, 40,000 tons for the 3 new battleships, whose design is not yet approved.

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TABLE II.—SECOND-CLASS BATTLESHIPS.

ENGLAND.			FRANCE.			RUSSIA.		
Date.	Name.	Displacement.	Date.	Name.	Displacement.	Date.	Name.	Displacement.
		Tons.			Tons.			Tons.
1870	Audacious	6,010	Comping.	Bouvines	6,590	1873	General Admiral ..	4,604
1866	Bellerophon	7,550	1885	Caiman	7,230	1875	Herzog Edinburgski ..	4,604
1882	Conqueror	6,200	1875	*Colbert	8,457	1878	Minin	6,168
1864	Hector	6,710	1873	Friedland	8,540	1882	Vladimir Monomach ..	5,796
1868	Hercules	8,680	1863	Héroine	5,587			
1887	Hero	6,200	1883	Indomptable	7,168			
1870	Invincible	6,010	1869	*Marengo	7,900			
1871	Iron Duke	6,010	1868	*Océan	7,500			
1869	Monarch	8,320	1885	Requin	7,200			
1868	Penelope	4,470	1865	*Revanche	5,819			
1871	Sultan	9,290	1873	*Richelieu	9,100			
1872	Swiftsure	6,910	1870	*Suffren	7,600			
1873	Triumph	6,640	1881	Terrible	7,200			
			Bldg.	Tréhouart	6,590			
			1876	*Trident	8,800			
	Total 13 Ships ..	89,000		Total 15 Ships ..	111,281		Total 4 Ships ..	21,172

* These ships are built of wood.

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TABLE III.—LOOK-OUT SHIPS.

ENGLAND.			FRANCE.		
Speed.	Name.	Displacement.	Speed.	Name	Displacement.
Knots.		Tons.	Knots.		Tons.
17	Alacrity	1,700	17¾	Condor	1,280
17	Archer	1,700	17	Epervier	1,280
19½*	Barham	1,830	17½	Faucon	1,280
16½	Barracouta	1,500	18	Fleurus	1,310
16½	Barrosa	1,580	17½	Vautour	1,280
19½*	Bellona	1,830	18	Wattignies	1,310
16½	Blanche	1,580			
16½	Blonde	1,580			
17	Brisk	1,770			
17	Cossack	1,770			
17	Fearless	1,580			
18	Iris	3,730			
18	Mercury	3,730			
17	Mohawk	1,770			
17	Porpoise	1,770			
17	Racoon	1,770			
17	Scout	1,580			
17	Surprise	1,700			
17	Tartar	1,770			
	Total 19 Ships	36,390		Total 6 Ships	7,740

* It is not considered necessary to try these ships with the maximum of forced draught.

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Table IV.—Torpedo Gun Vessels.

ENGLAND.			FRANCE.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
Knots.		Tons.	Knots.		Tons.
19¼	Alarm	810	18	Bombe	320
19¼	Antelope	810	21½	Cassini	925
20	Boomerang*	735	18½	Catinat	450
19¼	Circe	810	18	Couleuvrine	320
19	Dryad	1,070	18	Dague	320
20	Gleaner*	735	18	Dragonne	320
20	Gossamer*	735	18	Flèche	320
19	Grasshopper	525	21½	Iberville	925
19	Halcyon	1,070	18	Lance	320
19	Harrier	1,070	18½	Levoisier	450
19	Hazard	1,070	18½	Léger	450
19¼	Hebe	810	18½	Lévrier	450
19	Hussar	1,070	18	Sainte-Barbe	320
19¼	Jaseur	810	18	Salve	320
19¼	Jason	810			
20	Karrakatta*	735			
19¼	Leda	810			
19¼	Niger	810			
19¼	Onyx	810			
18	Polyphemus	2,640			
18½	Rattlesnake	550			
19¼	Renard	810			
20	Salamander*	735			
19	Sandfly	525			
20	Seagull*	735			
20	Sharpshooter*	735			
20	Sheldrake*	735			
20	Skipjack*	735			
20	Spanker*	735			
20	Speedwell*	735			
20¼	Speedy	810			
19	Spider	525			
	Total 32 Vessels	27,110		Total 14 Vessels	6,210

* It is not considered necessary to try these ships with the maximum of forced draught.

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TABLE V.—COAST DEFENCE SHIPS.

ENGLAND.			FRANCE.			RUSSIA.		
Date.	Name.	Displacement.	Date.	Name.	Displacement.	Date.	Name.	Displacement.
		Tons.			Tons.			Tons.
1876	Belleisle	4,870	1885	Achéron	1,640	1868	Admiral Chicagoff ..	3,511
1871	Cyclops	3,560	1870	*Bélier	3,600	1868	Admiral Greig	3,593
1871	Glatton	4,910	1872	*Bouledogue	3,400	1867	Admiral Lazareff ..	3,556
1871	Gorgon	3,560	1887	Cocyte	1,640	1868	Admiral Spiradoff ..	3,740
1871	Hecate	3,560	1885	Flamme	1,045	1864	Bronenosets	1,482
1870	Hotspur	4,010	1877	Fulminant	5,574	1867	Charodeika	2,026
1871	Hydra	3,560	1883	Furieux	5,700	1864	Edinorog	1,407
1879	Orion	4,870	1884	Fusée	1,045	1891	Gremyastchy	1,500
1864	Prince Albert ..	3,880	1888	Grenade	1,045	Building	Grozyashtchy	1,492
1872	Rupert	5,440	Building	Jemmapes	6,590	1867	Kniaz Pojarski	5,007
1863	Scorpion	2,750	1886	Mitraille	1,045	1864	Koldun	1,666
1863	Wivern	2,750	1863	Onondaga	2,600	1865	Kreml	3,664
			Building	Phlégéton	1,640	1864	Latnik	1,515
			Building	Styx	1,640	1864	Lava	1,591
			1862	*Taureau	2,700	1864	Netron-Menya	3,494
			1876	Tempête	4,523	1892	Otvazny	1,500
			1871	*Tigre	3,600	1873	Novgorod	2,706
			1880	Tonnant	4,707	1864	Perun	1,549
			1875	Tonnerre	5,700	1863	Pervenetz	3,279
			1875	Valmy	6,590	1867	Rusalka	2,026
			1878	Vengeur	4,523	1864	Smertch	1,520
						1864	Strelitz	1,431
						1864	Tifun	1,666
						1864	Uragan	1,415
						1875	Vice-Admiral Popoff	3,590
						1864	Veshtchun	1,448
	Total 12 Ships	47,720		Total 21 Ships	70,547		Total 26 Ships † ..	61,374

* Built of wood.

† Two coast-defence ironclads of 4020 tons to be built.

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TABLE VI.—ARMOURED CRUISERS.

ENGLAND.			FRANCE.			RUSSIA.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
Knots.		Tons.	Knots.		Tons.	Knots.		Tons.
18½	Aurora	5,600	19	Bruix	4,745	16½	Admiral Nachimoff ..	7,782
18½	Australia	5,600	19	Chanzy	4,745	15½	Alexander II.	8,440
18½	Galatea	5,600	19	Charner	4,745	15½	Dimitri Donskoi	5,893
18½	Immortalité	5,600	20	Dupuy de Lôme	6,297	14½	Gangoot	6,592
16¾	Impérieuse	8,400	19	Latouche Tréville	4,745	16	Navarin	9,476
18½	Narcissus	5,600	14	Bayard	6,000	15	Nicolai I.	8,440
14½	Nelson	7,630	14	Duguesclin	5,869	18	Pamyat Azova	6,000
13¼	Northampton	7,630	13	*La Galissonière	4,700	18	Rurik	10,923
18½	Orlando	5,600	13	*Triomphante	4,700	18	Rurik (No. 2)	10,923
12½	Shannon	5,390	14	*Turenne	6,400			
18½	Undaunted	5,600	14	Vauban	5,900			
16¾	Warspite	8,400	12¾	*Victorieuse	4,600			
14½	Achilles	9,820	19	New Charner	5,000			
14¾	Agincourt	10,690						
14	Black Prince	9,210						
14½	Minotaur	10,690						
14¼	Northumberland	10,780						
14¼	Warrior	9,210						
	Total 18 Ships	137,050		Total 13 Ships	68,446		Total 9 Ships	63,223

* Built of wood.

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TABLE VII.—PROTECTED CRUISERS, FIRST CLASS.

ENGLAND.			FRANCE.			RUSSIA.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
Knots.		Tons.	Knots.		Tons.	Knots.		Tons.
19	Blake*	9,000	19	Alger	4,160	19	Admiral Korniloff.. ..	5,000
20½	Blenheim*	9,000	19	Cécille..	5,766			
19½	Crescent	7,700	20	Isly	4,160			
20½	Edgar	7,350	20	Jean Bart	4,160			
19¾	Endymion	7,350	17	Sfax	4,488			
19½	Gibraltar	7,700	19	Tage	7,045			
19¾	Grafton	7,350		New (unnamed)	..			
19¾	Hawke	7,350						
19½	Royal Arthur..	7,700						
19½	St. George	7,700						
19¾	Theseus	7,350						
	Total 11 Ships.. ..	85,550		Total 7 Ships	29,779†		Total 1 Ship	5,000

* It is not considered necessary to try these ships with full forced draught.

† Tonnage of new ship unknown.

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TABLE VIII.—PROTECTED CRUISERS—SECOND AND THIRD CLASSES.

ENGLAND.			FRANCE.			RUSSIA.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
Knots.		Tons.	Knots.		Tons.	Knots.		Tons.
19¾	Æolus	3,600	20	Bugeaud	3,725	..	Griden †	..
17	Amphion	4,300	20	Chasseloup-Laubat ..	3,725	..	Pocadnick †	..
20	Andromache	3,400	19½	Coetlogon	1,850	15	Rynda	2,950
20	Apollo	3,400	20½	Cosmao	1,850	15	Vitiaz	2,950
17	Arethusa	4,300	20	Davout	3,027	..	Vœvada †	..
19½	Astræa	4,360	19½	Forbin	1,850			
19½	Bonaventure	4,360	20	Friant	3,725			
19¾	Brilliant	3,600	20	(New Ship (modified Forbin) .. .. ..)	2,204			
19½	Cambrian	4,360						
19½	Charybdis	4,360	20½	Lalande	1,877			
19½	Flora	4,360	20	Suchet	3,027			
19½	Forte	4,360	19½	Surcouf	1,850			
18	Forth	4,050	19½	Troude	1,877			
19½	Fox	4,360	20	(Two New Ships, each 3900 .. ..)	7,800			
19½	Hermione	4,360						
19¾	Indefatigable	3,600						
19¾	Intrepid	3,600						
19¾	Iphigenia	3,600						
19	*Katoomba	2,575						
20	Latona	3,400						
17	Leander	4,300						
19¾	Magicienne	2,950						
19¾	Marathon	2,950						
20	Medea	2,800						

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20	Medusa	2,800						
20	Melampus	3,400						
19¾	Melpomene	2,950						
18	Mersey	4,050						
19	*Mildura	2,575						
20	Naiad	3,400						
19	Pallas	2,575						
19	Pearl	2,575						
17	Phaeton	4,300						
19	Philomel	2,575						
19	Phœbe	2,575						
19¾	Pique	3,600						
19¾	Rainbow	3,600						
19¾	Retribution	3,600						
19	*Ringarooma	2,575						
20	Sappho	3,400						
20	Scylla	3,400						
18	Severn	4,050						
19¾	Sirius	3,600						
19¾	Spartan	3,600						
20	Sybille	3,400						
19	*Tauranga	2,575						
20	Terpsichore	3,400						
18	Thames	4,050						
20	Thetis	3,400						
20	Tribune	3,400						
19	*Wallaroo	2,575						
	Total 51 Ships	179,311		Total 14 Ships	38,387		Total 5 Ships	5,900‡

* Australian Defence. † Tonnage and speed not known. ‡ Plus the tonnage of the 3 new ships.

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TABLE IX.—COMPARATIVE STATEMENT SHOWING EXPENDITURE ON CONSTRUCTION OF NEW VESSELS, HULLS AND MACHINERY, IN ENGLAND AND FRANCE, FROM 1863–64 TO 1892–93.

Year.	England.	France.	Year.	England.	France.	Year.	England.	France.
	£	£		£	£		£	£
1863–64	1,282,710	920,196	1875–76	1,613,218	1,054,560	1887–88	2,819,537	2,510,020
1864–65	1,674,574	873,300	1876–77	2,121,960	1,301,988	1888–89	2,398,805 *190,708	1,848,930
1865–66	1,116,198	931,348	1877–78	2,922,442	1,501,884			
1866–67	1,014,406	875,468	1878–79	1,508,049	1,504,656	1889–90	3,243,105 384,024 †3,627,729	1,759,684
1867–68	1,800,749	797,104	1879–80	1,388,607	1,375,296			
1868–69	1,694,362	668,780	1880–81	1,426,349	1,345,084	1890–91	‡3,181,736 §3,595,930 6,777,666	2,396,000
1869–70	1,387,047	655,016	1881–82	1,682,500	1,400,152			
1870–71	1,330,814	411,948	1882–83	1,767,014	1,559,644			
1871–72	1,184,172	429,832	1883–84	1,930,090	1,536,508	1891–92	‖3,210,627 3,140,733 ¶6,351,360	2,800,000
1872–73	809,087	614,460	1884–85	2,242,070	1,510,704			
1873–74	1,290,028	789,684	1885–86	3,737,000	1,355,684	1892–93	2,685,224*a* 1,969,428*b* 4,654,652	2,800,000
1874–75	1,528,161	921,380	1886–87	3,495,000	1,280,000			

* **Expenditure on ships building under the Imperial Defence Act of 1888.** † Navy Estimates for 1889–90. ‡ Navy Estimates for 1890–91.
§ **Additional.** Provided under the Naval Defence Act. ‖ Of this sum £3,140,733 is provided under the Naval Defence Act, Section 1 (3) (*a*).
¶ **Navy Estimates for 1891–92.** *a* Navy Estimates for 1892–3. *b* Contract. Provided for under Naval Defence Act.

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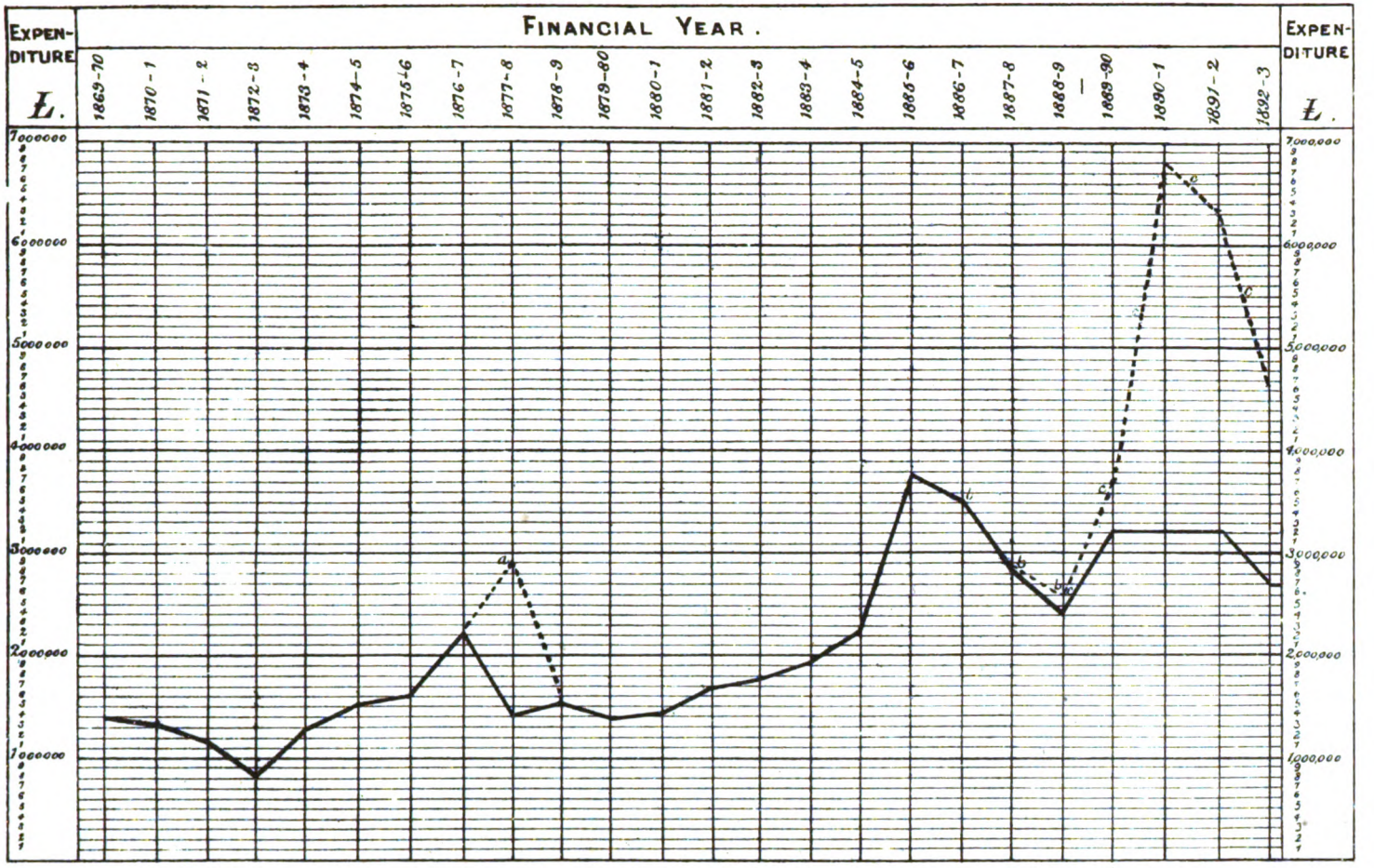
DIAGRAM SHEWING THE EXPENDITURE UPON THE CONSTRUCTION OF NEW SHIPS DURING THE 24 YEARS BETWEEN 1869-70 AND 1892-93.



Note. The distance at any point of the drawn line from the base represents on the scale of £1, the ORDINARY expenditure of the year marked by that point. The distance at any point of the dotted line from the base represents on the scale of £5, both the ORDINARY and the EXTRAORDINARY expenditure of the year marked by that point.

(a) Includes £1,573,000 for purchase of Ships under the Vote of Credit.
(b) Includes Expenditure under Lord Northbrook's Special Programme.
(c) Includes Estimated Expenditure under the Defence Acts of 1888 and 1889.

1889-90 to 1892-93 are Estimates.

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XII.

FRENCH NAVY ESTIMATES.

SUMS APPROVED BY PARLIAMENT TO BE SPENT IN THE YEARS **1892** AND **1891.**

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French Navy Estimates* for the years 1892 and 1891.

Cap.	Heads of Expenditure.	Credits allowed for the year 1892.	Credits allowed for the year 1891.
		£	
	PERSONNEL.		
1	Admiralty Office	48,008	45,708
2	Navy Pay	1,542,276	1,437,913
3	Marines.	368,301	376,086
4	Gendarmerie Maritime	32,839	33,200
5	Inspection of Administrative and Financial Service	13,322	13,383
6	Construction Staff	80,898	81,490
7	Administrative Staff	306,283	310,141
8	Medical Staff.	83,133	86,304
	LABOUR.		
	Wages—		
9	Shipbuilding; new ships; conversions; fitting for sea	444,908	427,828
10	Shipbuilding; repairs	235,564	236,160
11	Armaments; construction of new guns .	37,960	37,960
12	Armaments; repairs	48,160	48,160
13	Works	40,812	43,286
14	Victualling	18,230	34,160
15	Master-attendants' and Storekeepers' Departments	268,147	278,948
16	Miscellaneous	16,120	16,120
	MATÉRIEL.		
	Stores and Supplies—		
17	Admiralty	9,520	9,600
18	Ships fitting for sea; repairs . .	302,000	252,000
	Carried forward . .	£3,896,481	£3,768,447

* The figures given in these tables show the sums allowed by Parliament, and not, as usual, the sums proposed to be spent. The estimates for 1893 have been unusually delayed in publication. M. Weyl reports that they amount to £8,960,000, reduced from £10,000,000 proposed by the department.

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Cap.	Heads of Expenditure.	Credits allowed for the year 1892.	Credits allowed for the year 1891.
		£	£
	Brought forward . .	3,896,481	3,768,447
	MATÉRIEL—*continued.*		
	Stores and Supplies—*continued.*		
19	Shipbuilding; contracts for new ships .	508,030	373,760
	Supplementary for ditto . . .	597,970	340,000
20	Shipbuilding; new ships; conversions; fitting for sea	668,000	684,000
21	Armaments; manufacture of new guns .	320,000	360,000
	Supplementary for ditto . . .	40,000	40,000
22	Armaments; repairs	398,800	318,800
23	Torpedoes	87,840	145,840
24	Works; new and large alterations. .	79,360	110,160
	Ditto Supplementary for Defence of the Military Ports . . .	118,000	142,000
25	Works; repairs	56,800	57,600
26	Clothing	164,193	188,400
27	Victualling.	834,013	774,400
28	Barracks	32,189	36,102
29	Medicines	56,000	56,000
30	Machinery	139,567	184,368
31	Fuel and Lighting	30,400	32,000
32	Office Furniture, Printing and Stationery	40,553	40,552
	MISCELLANEOUS.		
33	Travelling expenses and freight . .	130,000	182,000
34	Allowance for lodgings	164,000	180,000
35	Charitable	49,285	45,950
36	Pensions to Seamen	311,271	309,072
37	Secret Service	2,600	2,600
38	Miscellaneous	10,500	10,500
	Totals . . .	£8,735,852*	£8,382,551

* Credits proposed for 1892, £8,516,136.

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Authorised Programme of New Construction, to be continued or undertaken in 1892.—Building in Dockyards.

A.—*Hulls, Fittings, Outfit, Putting Machinery in Place.*

Class.	Names of Ships.	Date of Order for Building.	Where Building.	Expenditure to be incurred in 1892.	State of advancement in hundredths. 1st January, 1892.	To advance in 1892.
				£		
Battleships	Neptune	Aug. 1882	Brest	1,120	99	1
	Brennus	Jan. 1889	Lorient	47,760	62	25
	Magenta	Jan. 1883	Toulon	27,520	87	13
	Charles Martel	..	Brest	38,840	6	20
	Lazare-Carnot	..	Toulon	35,720	6	16
	Massena	..	Lorient	9,960	..	..
Coast Defence Iron-clad	Tréhouart	Oct. 1890	Lorient	28,680	33	24
Armoured Gunboats	Phlégéton	Mar. 1885	Cherbourg	3,400	92	8
	Styx	Sept. 1889	Cherbourg	12,800	69	31
Armoured Cruisers, 1st class	Dupuy-de-Lôme	July 1888	Brest	21,760	79	21
	Charner	June 1889	Rochefort	30,800	36	34
	Bruix	Oct. 1890	Rochefort	22,520	8	25
1st-class Protected Cruiser	Isly	Aug. 1887	Brest	17,520	69	23
2nd-class Protected Cruisers	Suchet	Oct. 1887	Toulon	15,720	42	19
	Bugeaud	..	Cherbourg	16,000	5	21
	Chasseloup-Laubat	..	Cherbourg	23,600	6	29
	Friant	..	Brest	14,960	4	20
2nd-class Cruiser	New Ship	..	Toulon	1,920	..	6
Torpedo Cruiser	Fleurus	Mar. 11, 1891	Cherbourg	12,000	38	35
Transport	Vaucluse	May 1886	Rochefort	..	60	..
2nd-class Transport	Pacifique	Aug. 1885	Brest	..	16	..
Sailing Frigate	Andromède	July 1884	Lorient	..	21	..
Submarine Boat	Gustave-Zédé (ex-Sirène)	..	Toulon	5,760	34	66
				£388,360		

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AUTHORISED PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN IN 1892.—BUILDING IN DOCKYARDS—*continued.*

B.—*Machinery.*

Class.	Names of Ships.	Expenditure to be incurred in 1892.	State of Advancement in Hundredths.	
			January 1st, 1892.	To Advance in 1892.
		£		
Battleships. . . .	Brennus	8,480	66	32
	Lazare-Carnot . .	11,840	10	36
	New Ship . . .	3,240	..	10
Coast Defence Ironclad	Tréhouart . . .	5,400	29	36
First-class Protected Cruiser	Isly	3,680	76	16
Second-class Protected Cruiser	Suchet	920	69	4
Transport	Vaucluse . . .	320	85	7
		£33,880		

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AUTHORISED PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN IN 1892.—MACHINERY TO BE SUPPLIED BY CONTRACT.

Class.	Names of Ships.	Contractors.	Dates of Contracts.	Amount.	Payments in 1892.
		A.—*Machinery complete.*			
				£	£
Battleship . . .	Charles Martel .	..	..	140,000*	12,000
First-class Protected Cruisers .	Charner . . .	Soc. de la Méditerranée . . .	Mar. 12, 1890	74,936	19,393
	Bruix	..	..	74,936*	28,000
First-class Unprotected Cruiser .	Alger	Schneider & Co., le Creusot . .	June 6, 1888	93,003	15,569
Second-class Protected Cruisers .	Bugeaud . . .	..	..	94,400*	36,000
	Chasseloup-Laubat	..	..	94,400*	36,000
	Friant	..	..	94,400*	12,000
Second-class Cruiser . . .	New Ship . .	..	..	32,000*	..
Torpedo Cruisers .	Wattignies . .	Schneider & Co., le Creusot . .	Nov. 14, 1888	41,858	14,762
	Fleurus . . .	Schneider & Co., le Creusot . .	Feb. 18, 1891	40,684	6,781
Torpedo Gunboats	Léger	Schneider & Co., le Creusot . .	Aug. 7, 1889	18,563	3,090
	Lévrier . . .	Schneider & Co., le Creusot . .	Aug. 7, 1889	18,563	3,090
Submarine Boat .	Gustave Zédé (ex-Sirène) . . .	..	..	22,400*	18,400
					£205,085
		B.—*Boilers.*			
Battleship . . .	Brennus . . .	Belleville & Co., St. Denis . .	Mar. 26, 1890	34,200	5,700
Coast Defence Ironclad . . .	Tréhouart . .	Belleville & Co., St. Denis . .	June 10, 1891	18,824	9,412
					£15,112

* Contracts not entered into.

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AUTHORISED PROGRAMME OF NEW CONSTRUCTION TO BE CONTINUED OR UNDERTAKEN IN 1892.—BUILDING BY CONTRACT.

Class.	Names of Ships.	Contractors.	Dates of Contracts.	Price.	Payments in 1892, including Hulls, Armament, Fittings, and Engines.
				£	£
Battleships . .	Jauréguiberry .	Soc. de la Méditerranée, la Seyne	April 8, 1891	902,284	204,000
	New Ship . .	..	Contract not accepted .	902,284	64,000
First-class Armoured Cruisers	Chanzy . . .	Soc. de la Gironde, Bordeaux . .	Dec. 18, 1889	344,000	135,600
	Latouche-Tréville	Soc. de la Méditerranée, le Havre	Dec. 18, 1889	344,000	119,800
First-class Protected Cruiser .	New Ship . .	..	Contract not accepted .	384,840	32,000
Second-class Protected Cruiser .	New Ship . .	..	Contract not accepted .	145,600	16,000
Second-class Cruiser . . .	New Ship . .	..	Contract not accepted .	107,200	16,000
Transport . . .	New Ship . .	..	Contract not accepted .	378,640	32,000
Torpedo Gunboat .	Cassini . . .	..	Contract not accepted .	96,000	10,000
Torpedo Boats .	Torpedo Boats, 145, 146 . .	Normand, le Havre	April 2, 1890 Nov. 26, 1890	28,712	7,112
	Torpedo Boats, 170, 171 . .	Normand, le Havre	Nov. 26, 1890	27,112	12,712
	Chevalier . . .	..	Contract not accepted .	26,400	12,000
	Mousquetaire .	..	Contract not accepted .	26,400	12,000
	Corsaire . . .	..	Contract not accepted .	26,400	12,000
Sea-going Torpedo Boats . . .	3 Torpedo Boats .	..	Contract not accepted .	60,000	8,000
	Archer . . .	Normand, le Havre	Dec. 10, 1890	10,080	5,760
First-class Torpedo Boats . . .	10 Torpedo Boats	..	Contract not accepted .	126,400	16,000
Repairs . . .	..	..	..	..	37,970
					752,954
	Less 27 per cent. to be retained to meet contingencies				206,954
			Total		£546,000

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Authorised Programme of New Construction to be continued or undertaken in 1892.—Building by Contract.

Class.	Names of Ships.	Contractors.	Dates of Contracts.	Price.	Payments in 1892, including Hulls, Armament, Fittings and Engines.
				£	£
Coast Defence Ironclads	Bouvines	Soc. de la Méditerranée, la Seyne	Dec. 18, 1889	493,378	177,960
	Jemmapes	Soc. de la Loire, Nantes	Dec. 18, 1889	489,270	193,600
	Valmy	Soc. de la Loire, St. Nazaire	Dec. 18, 1889	489,270	137,600
Torpedo Gunboat	D'Iberville	.. ..	Dec. 18, 1889	102,000	36,000
Sea-going Torpedo Boats	Dragon	Normand, le Havre	Apr. 9, 1890	60,360	10,240
	Grenadier	Normand, le Havre	Nov. 19, 1890		
	Lancier	Normand, le Havre			
	Turco	Soc. de la Loire, Nantes	Apr. 16, 1890	38,260	4,970
	Zouave	Soc. de la Loire, Nantes	Dec. 3, 1890		
	Eclair	Soc. de la Méditerranée, la Seyne	May 21, 1890	54,181	4,860
	Kabyle		Dec. 17, 1890		
	Orage				
	Sarrasin	Soc. de la Gironde, Bordeaux	Apr. 9, 1890	34,995	13,795
	Tourbillon		Dec. 24, 1890		
Torpedo Boats	Six—147 to 149, 152 to 154	Normand, le Havre	Apr. 2, 1890 / Nov. 19, 1890	86,136	21,336
	Three—155 to 157	Soc. de la Gironde, Bordeaux	Apr. 9, 1890 / Dec. 3, 1890	40,548	11,708
	Three—158 to 160	Soc. de la Gironde, Bordeaux	Apr. 9, 1890 / Dec. 3, 1890	40,548	16,468
	Three—161 to 163	Soc. de la Loire, Saint Denis	Apr. 16, 1890 / Dec. 3, 1890	40,548	2,716
	Three—164 to 166	Normand, le Havre	Apr. 9, 1890 / Nov. 19, 1890	41,862	3,154
	Three—167 to 169	Schneider & Co., le Creusot	Apr. 22, 1890 / Dec. 3, 1890	40,548	8,148
					642,555
Less 12·8 per cent. to be retained to meet contingencies					82,555
Total					£560,000

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XIII.

German Navy Estimates, 1892-93.

ORDINARY PERMANENT ESTIMATES.

—	1892-93.	1891-92.
	£	£
Naval Cabinet and Chief Command Department.	1,665	3,065
Imperial Naval Office	44,531	44,484
Observatories	14,126	11,684
Salaries, Wages, &c., Scientific Department	12,536	11,701
Martial Law	1,794	1,507
Divine Service.	2,814	2,547
Military Personnel	523,800	496,623
Maintenance of Ships and Vessels in Commission*	511,635	434,510
Victualling	181,398	168,892
Clothing	5,728	5,728
Barrack Administration, Cashiers, and Accountants	66,366	51,442
Lodging Allowance	43,073	39,773
Medical	35,347	32,997
Travelling Expenses, Freight Charges, &c..	27,862	26,062
Training Establishments	8,648	8,329
Dockyard Expenses	626,470	608,814
Ordnance and Fortification	112,787	115,205
Torpedo and Mining Service	59,263	56,031
Pilotage, Buoys, and Lights	13,140	10,852
Miscellaneous Expenses	10,962	10,685
Total £	2,303,945	2,140,931

* Reduced by £31,825, by Committee of Reichstag.

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SPECIAL ORDINARY ESTIMATES.

Shipbuilding Programme, 1892–1893.

For the Construction of—	£
Cruiser Corvette H., 5th instalment	50,000
Armourclad Brandenburg (A.), 4th and last instalment	166,500
„ B., 4th instalment	90,000
„ C., 4th „	75,000
„ Kurfürst Friedrich Wilhelm (D.), 4th instalment	100,000
Armoured Vessel Frithjof (Q.), 4th and last instalment	30,000
„ „ R., 3rd instalment	60,000
Cruiser E., 3rd instalment	17,500
Sloop, 3rd instalment	75,000
Armoured Vessel S., 2nd instalment	75,000
„ „ U., „ „	75,000
Torpedo-boats, 1st instalment	164,000
Cruiser Corvette J., 2nd instalment	25,000
„ „ K., 1st „	*100,000
Armoured Vessel T., 1st instalment	75,000
„ „ V., „ „	75,000
„ „ W., „ „	†75,000
Cruiser F., 1st instalment	†37,500
Sloop N., „ „	†60,000
Preliminary Shipbuilding Work	7,500
Total	£1,433,000

Items other than Shipbuilding.

	£
Gun Armament of the Armourclads Brandenburg (A.), B., C., and Kurfürst Friedrich Wilhelm (D.), 3rd instalment	200,000
„ „ Armoured Vessels Beowulf (P.), Frithjof (Q.), and R., 3rd and last instalment	28,035
„ „ Armoured Vessels S., U., 1st instalment	50,000
„ „ Cruiser Corvette H., 3rd instalment	26,850
„ „ „ „ J., 1st instalment	16,500
„ „ „ „ F., „ „	†13,500
„ „ Sloop, 2nd and last instalment	7,900
„ „ „ N., 1st instalment	†6,000
Carried forward	£348,785

* Refused by Reichstag.
† Disallowed by Committee.

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Special Ordinary Estimates, 1892–93—*continued.*

Items other than Shipbuilding.

	£
Brought forward	348,785
Torpedo Armament of Armourclad Brandenburg (A.), 2nd instalment	12,500
" " Armourclads B., C., and Kurfürst Friedrich Wilhelm (D.), 1st instalment	25,000
" " Cruiser Corvette J., 1st instalment	3,150
" " Armoured Vessel S., and U., 1st instalment	3,000
" " Sloop N., 1st instalment	*4,000
Sundry Works, for Mining and Torpedo Service, &c., &c.	107,010
Total	£503,445

Extraordinary Estimates, 1892–93.

	£
Dry Docks and other Works at Kiel	†78,800
Works at Friedrichsort and Wilhelmshaven	47,830
Fortification of Heligoland	375,000
Guns, Torpedoes, Mining, &c.	53,550
Total	£555,180

Summary.

——	1892–93.	1891–92.
	£	£
Ordinary Permanent Estimates	2,303,945	2,140,931
Ordinary Special Estimates ‡—		
Shipbuilding	1,433,000	1,762,500
Other Items	503,445	650,058
Extraordinary Estimates	555,180	140,550
Total £	4,795,570	4,694,039

* Disallowed by Committee.
† Reduced by £76,600 by Committee.
‡ Reduced by £361,000.

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XIV.

Italian Estimates, 1892-93.

NAVY ESTIMATES.—FINANCIAL YEAR 1ST JULY, 1892, TO 30TH JUNE, 1893.

ORDINARY EXPENDITURE—GENERAL EXPENSES.

	1892-3.	1891-2.
	£	£
Admiralty	42,642	42,686
Expenditure on various services connected with the Mercantile Marine	234,869	283,163
Total	277,511	325,849
EXPENDITURE FOR NAVAL SERVICES.		
Ships fitting out, in reserve and completing	173,344	186,535
General Staff of the Navy	112,548	110,978
Corps of Constructors	41,600	41,360
Commissariat Service	43,036	42,765
Medical Service	24,708	24,708
Wages—Men	403,600	402,406
Gratuities	33,000	33,000
Assistants to Constructors	41,928	41,928
Accountants	24,198	23,798
Police	10,761	10,761
Telegraph Service	7,984	8,679
Telegraph Materials	8,000	8,800
Provisions	286,040	262,072
Lighting	8,404	9,092
Hospital Services	16,960	19,374
Honorary Distinctions	800	1,020
Fuel	117,776	142,800
Salaries and Wages—Workshops and Fortifications	6,032	12,032
Training Establishments	26,040	30,160
Naval Academy	**10,000**	**13,000**
Scientific Services—*Personnel*	**2,052**	**3,185**
" " *Matériel*	**11,518**	**13,186**
Law Charges	**1,220**	**1,220**
Carried forward £	**1,411,549**	**1,442,859**

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—	1892-3.	1891-2.
	£	£
Brought forward	1,411,549	1,442,859
Transport	36,960	41,376
Materials for repair of Ships	287,654	316,000
Labour for same	249,232	249,232
Guns, Torpedoes and Small Arms	399,600	408,000
Labour for construction and repair of Armaments	95,648	95,648
Works Department—Repairs	62,200	67,600
Completion, three Battleships (Re Umberto, Sardegna, Sicilia)		
Completion, five Cruisers (Etruria, Umbria, Elba, Liguria, Lombardia)		
Completion, one Torpedo Cruiser		
Building, two Cruisers (Marco Polo and F.)		
„ one Torpedo Cruiser J.	1,080,000	1,080,000
New Construction, one 1st-Class Battleship C.		
„ „ two 2nd „ „ Q. and R.		
„ „ six Torpedo Cruisers, K., L., M., N., O., P.		
„ „ Sea-going Torpedo-boats		
„ „ smaller craft		
Naval Expenditure at Massowah	34,000	38,800
Total £	3,656,843	3,739,515
Rents for lands occupied by Government	95,045	95,045

EXTRAORDINARY EXPENDITURE.

	£	£
Half Pay	2,000	4,000
Mercantile Marine—Construction at Naples	1,000	..
Shipbuilding	..	36,000
Naval Yard at Taranto	64,000	40,000
Works at Dockyard, Spezia	20,000	48,000
Coast Defence	4,000	..
Fortifications, Maddalena	20,000	..
Torpedoes	44,000	40,000
Total £	153,000	164,000

SUMMARY.

	£	£
Admiralty and Mercantile Marine	277,511	325,849
Naval Services	3,656,843	3,739,515
Rent of land occupied by Government	95,045	95,045
Extraordinary Expenditure	153,000	164,000
Grand Totals £	4,182,399	4,324,409

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XV.

Russian Navy Estimates, 1892.

CALCULATED AT £1 = 9 Roubles.

——	1892.	1891.
	£	£
Central Administration	196,262	196,390
Rewards, Pensions, Education of Children	51,066	50,656
Naval Schools	62,090	59,787
Medical	87,320	81,732
Wages	373,976	373,280
Provisions	158,182	112,978
Clothing	118,099	129,102
Navigation	629,972	581,897
Hydrographic Office	51,673	50,377
Guns, Torpedoes, and Electric Light	580,340	438,249
Construction	2,127,279	1,947,286
Workshops and Offices	318,724	280,868
Hire, Maintenance, Construction, and Repair of Buildings	373,435	402,974
Religion	49,000	56,252
Sundries	142,830	100,374
Total £	5,320,248	4,862,202

NEW PROGRAMME.

	£
Lizoi Veliky, ironclad, 8880 tons	795,000
Sevastopol, Poltava, and Petropaulosk, ironclads, 11,000 tons—each	1,098,222
1 Armoured Cruiser (Rurick type)	858,611
2 Coast Defence Ironclads, 4000 tons each	411,111
Voevada, torpedo-cruiser	111,111
Pocadnich "	111,111
Griden "	66,667
1 Look-out Ship	200,000
1 " "	133,333
10 First-class Torpedo-boats.	

The execution of this Programme will cost £10,777,778, £1,111,111 of which will be spent in the year 1892.

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XVI.

Report of the Secretary of the United States Navy for 1891.

NAVY DEPARTMENT, *December* 3, 1891.

TO THE PRESIDENT:

Ships laid down, 1891.

Of the new construction undertaken during this year, by far the most important is protected cruiser No. 13. This vessel, of 7500 tons displacement, is a sister-ship to cruiser No. 12. The peculiar advantages of these two cruisers consist in their extraordinary coal endurance and their high speed, in both of which respects they have no equal among the large cruisers of the world. With a maximum speed of 22 knots an hour and a sustained sea speed of 21 knots, they can safely be counted on, in any ordinary sea, to overtake any commerce destroyer, any commerce protector, or any mercantile vessel now afloat, while their ability to cruise for great distances without recoaling makes them a peculiarly important addition to a navy destitute of coaling stations abroad. Their triple-screw propulsion, one of their most important and original features, is at once effective for high speed and economical for ordinary service. The arrangement of the screws, tending to secure constant immersion in the water, is calculated to prevent the racing so common in single-screw and twin-screw vessels, which leads not only to reduction of speed, but to material increase of loss from wear and tear. Added to these advantages are a complete armour protection against light guns, and a battery comprising one 8-in. and two 6-in. breech-loading rifles of 40 calibres, eight 4-in. rapid-fire guns of the armour-piercing type, with twenty small-calibre rapid-fire guns, and five torpedo tubes, making them formidable antagonists for any vessel they may be called upon to fight.

Cruiser No. 12.

As with the vessels undertaken in the previous year, the battleships and No. 12, the Department made the utmost exertions to prevent loss of time in beginning the construction of cruiser No. 13. The following were the proposals received for the hull and machinery, including engines, boilers, and appurtenances, in accord-

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ance with the plans and specifications approved by the Secretary of the Navy:—

	$
Union Iron Works, of San Francisco	2,793,000
William Cramp & Sons' Ship and Engine Building Co., of Philadelphia	2,745,000
Bath Iron Works, Limited, Bath, Me.	2,690,000

This vessel, and her sister-ship, No. 12, are to have a guaranteed speed of 21 knots for four hours in the open sea, a condition which, as far as known, no shipbuilding firm anywhere, except Messrs. Cramp, had at that time ever undertaken to fulfil. The statute provides that the contract shall be let to the lowest and best responsible bidder or bidders. Under these circumstances, and in view of the fact that the Messrs. Cramp finally consented to reduce their bid $55,000 (that is to say, to the figure of the lowest bid), I had no doubt that my duty, under the statute, was to award that firm the contract for cruiser No. 13 at $2,690,000.

Harbour defence ram.

The second vessel in point of size and importance is the harbour defence ram of 2050 tons displacement, authorised by the Act approved March 2, 1889. But one bid for the construction of this vessel was received, that of the Bath Iron Works, of Bath, Me., for $930,000, and the contract was awarded accordingly, January 28, 1891. Since the execution of the contract, changes in the plans have been made, increasing the length of the vessel 8 ft., thus giving greater berthing capacity for the crew and space for stowage of coal, and admitting a battery of four 6-pounder rapid-fire guns to afford protection against torpedo-boats. The change has materially increased the coal endurance, and consequent radius of action of the vessel, while the substitution of a solid-steel casting for the stem, in place of the ram with removable head, as originally designed, gives the vessel greater strength for ramming purposes. The contract requires that the harbour defence ram shall be completed and ready for delivery in eighteen months from date of execution.

Torpedo cruiser.

Proposals for the construction of the torpedo cruiser of 750 tons were invited October 18, 1890, but no bids were received. The Department has not again advertised for proposals for the torpedo cruiser, it being clear that no one would offer to build her within the prescribed limit. The Act authorising her construction requires her "to have a maximum speed of not less than 23 knots." This high rate of speed requires engines of 6000 horse-power, and involves a correspondingly heavy expense. To build such a boat, it is estimated that the limit of cost should be increased $162,000, making $512,000, instead of $350,000, as originally projected. In

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view of the great merits of this type of vessel, I recommend that the law be amended to enable the Department to proceed with her construction.

The Act of June 30, 1890, also authorised the construction of a torpedo-boat of about 112 tons. The bid of the Iowa Iron Works being the lowest one received the contract was awarded to that Company October 8, for the sum of $113,500, the vessel to be completed, according to the Department's plans, in twelve months from the date of the contract. Torpedo-boat.

The Navy will therefore have within a year its second torpedo-boat, and it bids fair to be an improvement on the Cushing, whose excellent qualities have been thoroughly demonstrated; and it is a matter of additional satisfaction that it is to be built upon the interior waters of the country, thus tending to distribute more widely the benefits arising from the shipbuilding industry, and creating plants at a point remote from all possible attack.

Progress of Recent Construction.

During the past year four new vessels have been placed in commission, making a total number of thirteen since March 4, 1889, as follows:—

Name.	Displacement.	Commissioned.
	tons.	
Chicago	4,500	Apr. 17, 1889.
Yorktown	1,700	„ 23, 1889.
Petrel	870	Dec. 10, 1889.
Charleston	3,730	„ 26, 1889.
Baltimore	4,400	Jan. 7, 1890.
Cushing	99	Apr. 22, 1890.
Vesuvius	970	June 7, 1890.
Philadelphia	4,300	July 28, 1890.
San Francisco	4,083	Nov. 15, 1890.
Newark	4,083	Feb. 2, 1891.
Concord	1,700	Feb. 14, 1891.
Bennington	1,700	June 20, 1891.
Miantonomoh	3,815	Oct. 27, 1891.

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Delays in delivery of armour.

The delays in the delivery of armour may cause the dates of final completion of the twelve armoured vessels in the list to be somewhat later than was contemplated when the contracts were drawn; but with the increased sources of supply of armour plate now available, it is probable that this delay will be short, and it will be much more than compensated for by the superior quality of the armour which has been developed during the past year. In other respects the work upon the armoured vessels now building and fitting out is proceeding satisfactorily.

Monitors.

The double-turreted monitor Miantonomoh has already been put in commission, and will be ready during this month for such trials as it may be desirable to give her, all her guns being now in position, and the work of fitting the roof of the forward turret, which was necessarily postponed until the fourth gun was in place, being within a few days of completion. She will shortly start upon her first cruise. The other vessels of this class, the Terror, Amphitrite, and Monadnock, of 3990 tons, and the Puritan, of 6060 tons displacement, will be ready to receive their armour as soon as it can be delivered, and their completion may be expected by the spring of 1893. The 10-in. guns of the Terror are completed, and will be installed whenever the vessel is prepared to receive them.

Monterey.

The coast-defence vessel Monterey was successfully launched April 28, 1891, and is now ready to receive her armour. Her 10-in. and 12-in. guns, with their mounts, are well advanced, and will be ready for installation when required. The ship will probably be completed some time in the year 1892.

Maine.

The Maine has made fair progress since her launching, a year ago. The engines have been completed, and a shop trial of them took place on August 31, the power to work them being furnished by the turning engines. This test of the engines gave an opportunity to inspect carefully the adjustment and working of the valves, pistons, and other moving parts, which were found throughout to be highly satisfactory. Their installation is now making rapid progress, and will be completed in the contract time. The vessel will go into dock in December, the wooden backing will be secured in place at once, and the armour put on as fast as delivered. The vessel has for several months been ready for her transverse bulkhead armour, which was received a few weeks ago. Alterations have been made in the plans of the turrets, by which their weight has been reduced 134 tons, and this weight redistributed by increasing the thickness of the proposed barbette armour from 10½ in. to 12 in., and the side armour

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from 11½ in. to 12 in., thus adding materially to the defensive strength of the ship.

The work on the hull of the Texas has been especially satisfactory, the delays occurring in the previous year on account of want of material having been entirely overcome, and the ship will be ready for launching next spring. Unfortunately, in January last, work on the boilers was brought to a stop by the destruction of the contractor's boiler shops by fire, which also damaged the finished work and boiler material on hand, so as to make nearly all of it worthless. New shops and tools have been procured, and, after a delay of about eight months, the contractors have resumed work on the boilers. Notwithstanding this delay, the vessel is expected to be ready for service early in 1894. **Texas.**

The armoured cruiser New York was launched successfully on the 2nd instant, and her date of trial may be fixed about January 1893. With her high speed and great coal endurance, a 6-in. protective deck, and 5-in. side-armour plates of nickel-steel, and a powerful battery well supplied with armour protection against the fire of everything except the heaviest guns, this vessel will be a most important addition to the naval strength of the country. **New York.**

The work upon the battleships Indiana, Massachusetts, and Oregon is going on rapidly, the two former having their frames erected up to the armour belt. At present, it is impossible to give with certainty the date of completion of these vessels, as much depends upon the delivery of the armour plates, as required, during the construction of the hull; but the Department has every reason to believe that except for delays on account of armour they would be completed within the contract requirements. According to present probabilities they will be ready for service early in 1894. **Indiana, Massachusetts, Oregon.**

The progress of work upon the unarmoured vessels of the Navy is equally satisfactory.

The Detroit, formerly known as cruiser No. 10, was launched at the Columbian Iron Works, Baltimore, Md., on October 28, and cruiser No. 9 will be launched this year. Cruiser No. 11, building at the works of Harrison Loring, is nearly ready for launching, and unless her construction is delayed by the assignment of the contractor, which occurred on October 16, she will, together with her sister-ships, cruisers 9 and 10, be ready for service early in the autumn of next year. **Detroit.** **Cruisers Nos. 9 and 11.**

Work upon the Raleigh, at the Norfolk navy-yard, is being pushed rapidly forward, 219 tons of material having been worked into the hull between July 1 and October 1 of this year. She will be ready **Raleigh.**

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Cincinnati. for launching next month. The Cincinnati, which is a sister-ship to the Raleigh, will be ready for launching at the New York navy-yard by next spring. Both these vessels will be ready for service early in 1893.

Cruiser No. 6. Cruiser No. 6 is under construction at the Union Iron Works, San Francisco, Cal. The work on this vessel is more than one-third completed, her construction having been somewhat delayed by difficulties in obtaining material, but unless further delays are experienced she will probably be completed during the summer of 1893.

Cruiser No. 12. The construction of Cruiser No. 12 is progressing in a highly satisfactory manner, about three-tenths of the hull having been completed on October 1. She should be ready for service by the autumn of 1893.

Gunboats Nos. 5 and 6, building at the Bath Iron Works, are more than half completed, and will be ready for service by next summer.

The steel practice vessel is also approaching completion. Her frames are erected, the outside plating is nearly completed, and many of the interior fittings are finished. About two-thirds of the work on the hull is now completed, and the vessel will probably be ready for final delivery by July 1892.

Newark. Of the three contract vessels put in commission during the past year, the Newark, built by William Cramp & Sons, was given her final contract trial on December 22, 1890. During a four-hour test at sea, off the capes of the Delaware, the engines developed an average of 8869 indicated horse-power, the maximum horse-power being 9231. The estimated speed from patent log for the four hours' trial was 19 knots, the ship's displacement at the beginning of the trial being 3970 tons. The behaviour of the vessel during the steam, turning, and other trials was entirely satisfactory, and she is a valuable addition to the list of cruisers available for service.

Concord. The Concord, built by N. F. Palmer, Jr., & Co., underwent a first contract trial on November 19, 1890; but as the horse-power obtained was not satisfactory to the contractors, a second trial was authorised by the Department, and took place in Long Island Sound on January 13, 1891. The engines developed during four hours an average of 3405 indicated horse-power, the maximum horse-power being 3513. The estimated speed of the ship, allowance being made for tide, was 17 knots, the average displacement during the trial being 1707 tons.

Bennington. The Bennington, a sister-ship of the Concord, and also built by N. F. Palmer, Jr., & Co., underwent preliminary contract trials on February 26, February 28, and April 1, and her final contract trial on April 2, 1891. This trial took place in Long Island Sound, the

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engines developing during four hours an average of 3436 indicated horse-power, the maximum horse-power at any time being 3533. The estimated speed of the ship was 17·5 knots, and her displacement 1750 tons.

The Concord and Bennington are similar to the Yorktown, and carry, for their size, a comparatively heavy battery, while their light draught will permit their use for some services that a larger vessel would be incapable of performing.

Since the last Report the Charleston has received her 8-in. guns in place of the 6-in. temporarily put on board. The battery of the Dolphin has also been improved by the substitution of two 4-in. rapid-fire guns for the 6-in. originally assigned to the vessel.

Wooden ships.

Of the old wooden ships of the Navy there are in existence two second-rate vessels, the Lancaster, the present flag-ship of the Asiatic Station, and the Pensacola, now stationed at Honolulu. The Lancaster probably has six years of service before her, but the cruising days of the Pensacola are numbered. Ten third-rate vessels remain—the Marion and Alliance on the Asiatic Station; the Mohican, Iroquois, and Thetis on the Pacific; the Kearsarge on the North Atlantic; the Essex and Yantic on the South Atlantic; and the Adams at Mare Island. Of these the Yantic and Adams are probably good for five more years of service, and the others for two or three. The Omaha, Swatara, and Nipsic are not in condition for further cruising, and the Enterprise is temporarily serving the purpose of a practice vessel at the Naval Academy, until the completion of the new ship of that class.

ARMOUR.

By far the most momentous question which the Department has had to consider in connection with the construction of the new Navy is that of armour: first, to secure a supply of American manufacture; and secondly, to determine what kind of armour should be adopted, having reference both to its composition and mode of treatment.

A supply of domestic manufacture having after considerable delays been provided by contracts with the Bethlehem Iron Company and Messrs. Carnegie, Phipps & Co., it remained for the Department to determine finally the material and method of treatment that should be adopted.

A series of tests made during the spring and summer confirmed the conclusions formed at the Annapolis trial as to the superiority

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of nickel-steel, and the Department accordingly decided to adopt it, and made arrangements with the contractors looking to that end.

Trials at Indian Head.

It remained, however, to give a thorough trial to the first armour of domestic manufacture before beginning to place it upon the vessels. The results of the trials, which took place at Indian Head,* were in the highest degree satisfactory. Each of the six plates manufactured in this country was superior to the English compound plate, while the nickel Harveyed plate and the high-carbon nickel plate were superior to all the foreign plates of the Annapolis trial. They may therefore be pronounced in advance of the best armour hitherto manufactured in Europe.

The trial also definitely establishes the fact that armour of excellent quality may be produced by the rolling process, and that forging by means of the hammer, the greatest source hitherto of expense in manufacture, is no longer to be regarded as an absolute necessity. The importance of this fact can hardly be over-estimated, for it raises a probability that within a year or two the armour-producing capacity of the United States may be quadrupled in case of necessity, and that if we had 10,000 tons to let and could give eighteen months from date of contract to commence delivery, the cost of manufacture would be reduced from 25 to 33 per cent., while the work hitherto confined to two firms, would be thrown open to a large number of competitors.

It may be assumed that the principle of super-carburizing steel to a considerable depth has passed beyond the experimental stage. The question of tempering or chilling the carburized armour plate needs, however, further experimental development, and the lack of uniformity in results, indicated in the Indian Head armour trials, may probably be ascribed to this want of experience. The assurance of success, however, is so great as to warrant the Department in making further experiment in this direction with every reason for anticipating a completely satisfactory result.

ORDNANCE.

A test has been made of the 4-in. rapid-fire gun. The results are extraordinarily successful. The primary object of this type of gun is rapidity of fire, and the trial resulted in an actual showing of five unaimed rounds in 17 secs., or at the rate of 16 shots a minute. The gun, breech mechanism, and cartridge cases, all operated in the

* See Section on Armour, p. 294.

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most satisfactory manner. The remaining guns of this calibre will be rapidly completed.

The trial of the 5-in. rapid-fire gun will take place as soon as cartridge cases can be obtained, with every prospect of equally good results.

The number of heavy guns has largely increased during the past year, and they show marked improvements. These are mainly in the direction of increased length, thereby securing great range and flatness of trajectory, and a consequent ability to be made effective at longer distances.

TORPEDOES.

Whitehead torpedo manufactured in United States.

The manifest importance of the proper development of torpedoes has induced the Department to put this subject under the special charge of a Torpedo Board, under the Bureau of Ordnance. Questions regarding the installation and proper disposition of torpedoes are being rapidly settled by the Board, and the practical knowledge of this subject has been materially advanced. In the Report of last year the fact was stated that the Navy was absolutely destitute of any automobile torpedo, but strenuous efforts have been made to remedy this vital defect, and have resulted in the establishment, by the E. W. Bliss Company, of Brooklyn, N.Y., of a plant for the manufacture of Whitehead torpedoes in this country. The contract was entered into in May last, for one hundred 18-in. torpedoes of the most recent type. The successful domestication in this country of the manufacture of the Whitehead torpedo is one of the most important advances in naval development that has been made for several years.

Howell and other torpedoes.

The delays in the completion of the Howell torpedo were fully referred to in the last annual Report. Successful experiments with this torpedo will, it is hoped, shortly be made; and the Hall torpedo, constructed at the torpedo station, is approaching completion. The three Patrick torpedoes ordered three years ago have now been delivered.

Important work has been done in the preparation of launching-tubes, and other tubes connected with the use of torpedoes, and the present state of the work is such as to justify the belief that the torpedo outfits may be installed on board our vessels within a short period, and that the torpedo equipments of our new navy will soon equal, if not surpass, those possessed by other nations.

Submarine gun.

The contract made in 1890 with the Ericsson Coast Defence Company for one 16-in. submarine gun and its projectiles having been greatly delayed, the work has been undertaken at the Washing-

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ton Gun Factory, the expense to be borne by the contractors. It seems probable that this gun will prove an important adjunct to our defensive armament.

* * * * * *

The progress made abroad in the construction of submarine boats has been carefully watched, and it is believed that recent developments in the applications of electricity have greatly simplified the problem, and point to the expediency of constructing such a boat in the near future.

Vesuvius Trials.

Under date of May 13, 1891, a Board of Officers, of which Commander R. D. Evans was senior member, was appointed by the Department to determine the following points in regard to the Vesuvius and her guns:—

Points to be determined.

(1.) The accuracy of fire at different ranges under favourable conditions.

(2.) The readiness with which the range can be altered.

(3.) The effect of a slight and of a moderate sea and wind.

(4.) The general efficiency of the guns and of the vessel as a platform.

(5.) The actual efficiency of the vessel for offensive purposes.

After a trial lasting for three days, during which two of the vessel's three guns were used, the Board reported its conclusions as follows:—

Conclusions of Board.

"The accuracy of fire of the starboard gun under the conditions we consider good; that of the middle and port guns we are unable to criticise, because the valves were not in satisfactory working order. The valve of the starboard gun has been modified by Lieut. Seaton Schroeder, and worked satisfactorily throughout. The range can be very readily altered, the setting of the valves can be changed to any point from extreme to shortest range in five seconds. The effect of a moderate sea and wind on the general efficiency of the guns and their range is very slight. Generally speaking, the vessel as a gun platform behaved very satisfactorily. There are many details concerning the steering gear and conning tower which could be very much improved. As to the actual efficiency of the vessel for offensive purposes, the Board has little data on which to base an opinion.

On May 20 three shots were fired at a target towed by the Cushing at a speed of 10 knots across the line of fire, the Vesuvius steaming 17 knots; one of these would undoubtedly have struck a vessel.

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This the Board considers a favourable showing under the circumstances. The Board considers that the fittings and appliances for loading and firing these guns as fitted are very crude, and capable of great improvement. The Board would recommend that the guns should be carefully ranged in some suitable locality where the fall of the projectiles can be accurately determined from shore stations, that some simple and suitable sight should be fitted, and such changes made in the mechanism for loading and firing the guns as may be found advisable, and that the vessel be then subjected to such further tests as will fully determine her efficiency as a torpedo thrower."

In accordance with the recommendation of the Board, a further test of the Vesuvius was decided upon, and the Board was directed to draw up a programme therefor. The trial will take place as soon as the Dynamite Gun Company can furnish the necessary projectiles.

Ordnance Establishments.

The development of the gun factory has continued during the year, and many improvements have been made in the appliances. . . . The results accomplished, both in the character of the work done and in its economy, have justly given it the reputation all over the world of a model establishment.

The growing demands for the naval defence of the Pacific coast, and the great expense entailed by transportation of heavy ordnance freights across the continent, point to the absolute necessity of establishing in the near future an ordnance factory at some point in that neighbourhood. Such an establishment should be under the general control of the War Department and the Navy Department, and should do the work of both. The work of the Washington gun factory shows what experience and intelligence can accomplish in this direction, and if Congress should adopt the measure the Navy can furnish the men to carry it out.

Ships in Commission.

The past twelve months have given the vessels of the Navy more active employment than they have seen for many years. Especially in the Pacific the demands on the fleet have been numerous and constant.

The North Atlantic squadron, under the command of Rear-Admiral Bancroft Gherardi, consists of the Philadelphia, Miantonomoh, Con- North Atlantic Squadron.

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cord, Kearsarge, and Vesuvius. The Miantonomoh is now completing her preparations for sea.

South Atlantic Squadron.

The South Atlantic squadron at the date of the last Report was composed of the Pensacola, Essex, and Tallapoosa. On the breaking out of the Chilean revolution, in January last, the Pensacola was withdrawn for service in the Pacific. The Tallapoosa has been condemned, and ordered to be sold on the station. In October last, the Yantic was ordered to join the squadron. In view of the additional importance recently acquired by this station, the Department has ordered the Squadron of Evolution to duty in that quarter.

Pacific Squadron.

The Pacific squadron, under the command of Acting Rear-Admiral George Brown, consists at the present time of the San Francisco, Baltimore, Charleston, and Yorktown, to which the Boston will be added on her arrival. Three wooden ships also are attached to this squadron, the Pensacola, Mohican, and Iroquois.

Asiatic Squadron.

The Asiatic squadron is under the command of Rear-Admiral George E. Belknap, who will shortly be relieved by Rear-Admiral David B. Harmony in the Lancaster. The other vessels of the squadron are the Marion, Alert, Alliance, Monocacy, and Palos. The Petrel is on her way to the Asiatic station. The condition of affairs in China requires these vessels to be constantly engaged on active duty.

Squadron of Evolution.

The Squadron of Evolution, under Acting Rear-Admiral J. G. Walker, has continued in active training service, having cruised from January to April in the Gulf, and from May to October on the Atlantic coast. In July 1891 the squadron was employed in carrying out a programme of fleet exercises and manœuvres in connection with the naval militia of Massachusetts and New York. This programme included, besides the usual drills and target practice, a torpedo attack upon the fleet, and landing drills and engagements on shore. The exercises, in addition to the training of the militia, afforded valuable experience to the officers and men of the squadron in the actual use of all the new appliances for combat with which the ships are provided.

Other useful experience has been gained by the squadron, especially in the training of commanding, navigating, and watch officers to manœuvre vessels with skill and safety in close formation and in narrow waters, and in the training of engineers to gauge and regulate carefully the speed and coal consumption of their engines. The habitual cruising formation of the squadron has been in column at half distance, and its speed 10 knots. Special practice has been

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given in entering and leaving port in this formation. As a test of the training which has been acquired by the officers and men of the squadron, it may be mentioned that in September, being then composed of seven ships, it entered the harbour of New York from Long Island Sound, maintaining its formation at half distance and its speed of 10 knots through Hell Gate and the East River and past the Battery into the North River to Fiftieth Street.

Attack at Valparaiso upon the Seamen of the Baltimore.*

At 2 P.M. on the 16th of October, the Baltimore being then at anchor in the harbour of Valparaiso, a number of seamen belonging to the ship went on shore in uniform for liberty, in accordance with the universal practice prevailing on board ships of war in foreign ports. Two weeks had passed since the surrender of Valparaiso to the Congressionalist leaders, and the city was quiet. Other foreign war ships in the harbour had already given liberty to their crews, and no reason existed for withholding a like privilege from the crew of the Baltimore.

Seamen attacked in streets of Valparaiso.

At 6 P.M. the men had been ashore four hours. It is the general testimony that they had been during this period, and were then, orderly, sober, and well-behaved. The first encounter appears to have taken place at this time between one of the crew of the Baltimore and a Chilean, who spat in his face. The sailor knocked the Chilean down, and was immediately set upon, with his companion, another of the Baltimore's crew, by an angry crowd. The two sailors took refuge in a passing street-car. They were dragged from the car by the crowd. One of them, petty officer Charles Riggin, was stabbed, and left to die in the street. His companion, Talbot, an apprentice, escaped, but was afterwards arrested, catgut nippers were put on his wrists, and he was struck again and again by the police on his way to prison.

Another petty officer, Johnson, then in a neighbouring house, seeing Riggin lying helpless in the street, went to his assistance. The crowd had now left. Finding Riggin still breathing, Johnson took him in his arms to carry him to a drug store near by. At this moment a squad of Chilean police, with fixed bayonets, came up the street. When at close quarters they fired at Johnson, being so near that his face was blackened by the discharge. One shot entered

* This part of the Report is printed *in extenso*, as the incidents with which it deals were nearly the cause of a war between the United States and Chile.—Ed.

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Riggin's neck and shoulder, inflicting a death-wound. Another shot passed through Johnson's clothes.

Behaviour of the Police.

The affair of the street-car was only one of many simultaneous attacks made upon the Baltimore's men. The attacks lasted for an hour. They were not confined to one locality, but occurred at several widely separated points in the city. In many instances the American sailors were in restaurants and hotels quietly getting supper when attacked by crowds numbering from 25 to 200 men. The part borne by the police in these attacks is shown by the reports. Thirty-six of the Baltimore's men were arrested and taken to prison, being subjected on the way to treatment of the utmost brutality. Catgut nippers were placed on their wrists, and in the case of one man, McWilliams, a lasso was thrown around his neck. Williams, another apprentice, nineteen years of age, was arrested by a mounted policeman, who put the nippers around his wrists, and then started his horse into a gallop, throwing the boy down. Coal-heaver Quigley, in trying to escape from the mob, was struck with a sword by a police officer. Petty officer Hamilton was dragged to prison dangerously wounded and unconscious, and his companions, attempting to relieve his sufferings, were threatened with blows from musket butts, and compelled to desist.

Men killed or disabled.

Coal-heaver Turnbull received eighteen wounds in the back, two of which penetrated his lungs, and subsequently caused his death. Other men were seriously injured, and several of the wounds were caused by bayonet thrusts, clearly showing the participation of the police. As a result of the attacks, two of the men, Riggin and Turnbull, died, and eighteen others were more or less disabled by wounds.

At the examination immediately following the arrest, which was conducted secretly, a request was made of the authorities by Capt. Schley to allow one of his officers to be present in the court. The request was denied. Before the men were discharged they were required to sign a paper in Spanish. A court official, whom one of the men asked what might be the meaning of the paper, declared that it was a mere form, stating that the signer had not been engaged in the trouble.

The sailors during the attack were without arms, and therefore defenceless. Of the thirty-six men arrested and examined, all were discharged, there being no proof of any violation of the peace on their part. The judicial investigation into the conduct of the men failed to show that a single one was found drunk or disorderly. It is clear that their only offence lay in wearing the uniform of the country to which they belonged.

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Whether the attacks upon the seamen of the Baltimore were preconcerted or not, their real cause can only be found in the bitter hostility of the Chileans towards the United States—a feeling largely due to the false and malicious accusations which have been put forth at Iquique, and later at Valparaiso, in reference to the action of the Navy of the United States during the progress of the revolution.

It is due to the Navy to state that, so far from having given cause for such a feeling, its conduct, under the instructions of the Department, has in every respect been fair, just, and temperate.

Instructions of Navy Department to Admiral on coast.

In March, some time after the revolution broke out, and before anything definite could be learned from the meagre sources of information at hand as to the relative strength of the contestants and the probability of either party's success, the Navy Department issued instructions to Admiral McCann, and afterwards to Admiral Brown, which are embodied in the following letter:—

"NAVY DEPARTMENT, *Washington, March* 26, 1891.

"SIR,—When the United States flag-ship San Francisco is ready for sea, you will proceed with her to the waters of Chile, South America, relieve Rear-Admiral W. P. McCann of the command of that part of the Pacific Station, and protect American interests. The duty thus imposed upon you calls for the exercise of great discretion. Owing to the stoppage of communication the Department is without authentic details in reference to the condition of affairs in Chile, and you will therefore be compelled to rely chiefly upon your own judgment in the execution of its orders, in view of the facts as you shall ascertain them.

"The Chilean Minister at Washington has sent the following communication to the Department of State:

"'I regret to inform you of a revolt of a division of the Navy of the Republic of Chile, in the port of Valparaiso, on the 7th of this month. My Government has declared the revolted squadron outlawed, and instructs me to inform you that it is not answerable for the acts of the rebels in regard to foreigners or citizens.'

"On the 4th of March the Department sent to Rear-Admiral McCann, by telegraph, the following instructions in cipher:

"Insurgent vessels, although outlawed by Chilean Government, are not pirates, unless committing acts of piracy. Observe strict neutrality. Take no part in troubles further than to protect American interests. Take whatever measures are necessary to prevent injury by insurgent vessels to lives or property of American citizens, includ-

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ing American telegraph cables. Endeavour to delay bombardment by insurgents until American citizens and property are removed, using force, if necessary, only as a last resort, and when serious injury is threatened. American vessels seized by the insurgents without satisfactory compensation are liable to be recovered forcibly; but you should investigate matter fully before taking extreme measures, and use every precaution to avoid such measures if possible.

"As a further and more explicit guide for your action you are directed:

"(1.) To abstain from any proceedings which shall be in the nature of assistance to either party in the present disturbance, or from which sympathy with either could be inferred.

"(2.) In reference to the ships which have been declared outlawed by the Chilean Government, if such ships attempt to commit injuries or depredations upon the persons or property of Americans, you are authorised and directed to interfere in whatever way may be deemed necessary to prevent such acts; but you are not to interfere except for the protection of the lives or property of American citizens.

"(3.) Vessels or other property belonging to our citizens which may have been seized by the insurgents upon the high seas, and for which no just settlement or compensation has been made, are liable to forcible recovery; but the facts should be ascertained before proceeding to extreme measures, and all effort made to avoid such measures.

"(4.) Should the bombardment of any place by which the lives or property of Americans may be endangered be attempted or threatened by such ships, you will, if and when your force is sufficient for the purpose, require them to refrain from bombarding the place until sufficient time has been allowed for placing American life and property in safety.

"You will enforce this demand if it is refused, and if it is granted, proceed to give effect to the measures necessary for the security of such life or property.

"(5.) In reference to the granting of asylum, your ships will not of course be made a refuge for criminals.

"In the case of persons other than criminals, they will afford shelter wherever it may be needed, to Americans first of all, and to others, including political refugees, as far as the claims of humanity may require and the service upon which you are engaged will permit.

"The obligation to receive political refugees and to afford them an asylum is, in general, one of pure humanity. It should not be continued beyond the urgent necessities of the situation, and should in no case become the means whereby the plans of contending factions

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or their leaders are facilitated. You are not to invite or encourage such refugees to come on board your ship, but, should they apply to you, your action will be governed by considerations of humanity and the exigences of the service upon which you are engaged. When, however, a political refugee has embarked, in the territory of a third power, on board an American ship as a passenger for purposes of innocent transit, and it appears upon the entry of such ship into the territorial waters that his life is in danger, it is your duty to extend to him an offer of asylum.

"(6.) Referring to paragraph 18, page 137, of the Navy Regulations of 1876, which is as follows:

"'If any vessel shall be taken acting as a vessel of war or a privateer without having proper commission so to act, the officers and crew shall be considered as pirates, and treated accordingly;'

"you are informed that this paragraph does not refer to vessels acting in the interests of insurgents and directing their hostilities solely against the State whose authority they have disputed. It is only when such vessels commit piratical acts that they are to be treated as pirates; and unless their acts are of such a character, or are directed against the persons or property of Americans, you are not authorised to interfere with them.

"(7.) In all cases where it becomes necessary to take forcible measures, force will only be used as a last resort, and then only to the extent which is necessary to effect the object in view.

"The U.S. ship Baltimore, now en route to the Pacific, is assigned to duty on the station under your command.

"Very respectfully,

"B. F. TRACY,

"*Secretary of the Navy.*

"Rear-Admiral GEORGE BROWN, U.S.N.

"*U.S. Flag-ship San Francisco, Navy-yard, Mare Island, Cal.*"

The instructions quoted above, which were prepared in the Navy Department and carefully considered by the Cabinet, show conclusively that the Navy was directed to preserve, in reference to the Chilean controversy, an attitude of absolute fairness and impartiality. So strongly did this disposition prevail among the officers themselves that, before these instructions were issued, Admiral McCann had already, in February, upon his arrival on the station, published a general order enjoining the officers and men under his command to maintain the strictest neutrality, "to abstain from discussing or criticising the present unfortunate state of affairs in Chile, and in no

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way to express any sentiments or opinions, either favourable or unfavourable, to either side."

With such a spirit animating the commander-in-chief, there is no doubt that the instructions of the Department were carried out to the letter. In these instructions the implied assumption by the Chilean Government that the insurgent vessels should be regarded as outlaws was repudiated. Strict neutrality was commanded. So careful was the Department to prevent any erroneous conclusions that might be drawn by officers as to the character of these vessels that it expressly revised and corrected its regulation for the treatment of ships of war acting without a regular commission.

Causes of hostile feeling of Chileans. Itata affair.

The first distinct cause of hostile feeling was the affair of the Itata. This vessel was a transport belonging to the Congressionalist party. Having been seized at San Diego for an alleged violation of our neutrality laws, she had broken her arrest and put to sea, placing an armed guard over the United States deputy marshal, who had been left in charge of the vessel. He was thus held a prisoner, until put ashore eight miles from the anchorage.

The act of the Itata, in forcibly removing herself from the legal and actual possession and custody of the United States, led the Navy Department, upon receiving information of the facts from the Department of Justice, to order the Charleston, then at San Francisco, to proceed at the earliest moment in search of the Itata, to seize her if found upon the high seas, and restore her to the jurisdiction of the Court. The order was issued on the 8th of May, and the Charleston left San Francisco a few hours after.

At the date of this occurrence Admiral Brown, in the flag-ship San Francisco, was at Iquique, the seat of the Provisional Government. Upon hearing of the high-handed proceedings of the Itata, Señor Errazuriz, Secretary of Foreign Relations of the Council, on May 13, five days after the occurrence, wrote the following letter to Admiral Brown :—

"IQUIQUE, *May* 13, 1891.

"ESTEEMED SIR,—The Provisional Government has learned by the cablegrams of the Associated Press that the transport Itata, detained in San Diego by order of the Government of the United States for taking on board munitions of war, and in the possession of the marshal, left the port carrying on board this official, who was landed at a point near the coast, and then continued her voyage. The Government has learned directly nothing more of the acts of the Itata since she left San Diego.

"If this news be correct this Government would deplore the conduct

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of the Itata, and, as an evidence that it is not disposed to support or agree to the infraction of the laws of the United States, the undersigned takes advantage of the personal relations you have been good enough to maintain with him since your arrival in this port to declare to you that as soon as she is within reach of our orders his Government will put the Itata, with the arms and munitions she took on board in San Diego, at the disposal of the United States as you may direct, through the worthy agency of yourself, in order that the laws of your nation may follow their course interrupted in San Diego.

"I have the honour to subscribe myself, the Secretary of Foreign Relations of the provisional Councils of Government,

"ISIDORO ERRAZURIZ."

The offer made by Señor Errazuriz in the above letter was absolutely voluntary. It was thus the Iquique Government itself which, within five days of the occurrence, disavowed the act of the Itata, and stated its intention to put her, with the arms that she had taken on board, at the disposition of the United States. A want of clearness in reference to the arms to be restored led to a brief correspondence, and, as soon as this point was settled, no time was lost by the Navy Department in revoking the Charleston's orders. A message from Admiral Brown to Señor Errazuriz expressed the gratification of the United States Government at learning that those for whom the Itata acted disapproved of her conduct.

The Itata arrived at the Chilean port of Tocopilla on June 3, and proceeded to Iquique, and, in fulfilment of the voluntary promise made by Señor Errazuriz, sailed on June 13 for San Diego, with the Charleston in company, both vessels arriving on the 4th of July.

Submarine cable off Iquique.

The next incident which seems to have excited a feeling of ill-will in the minds of the Chileans was the junction of the ends of the submarine cable outside of Iquique. Application had been made by the representative of the Central and South American Telegraph Company, an American corporation, to the authorities of that place, requesting that the company's new cable extending to Valparaiso might be permitted to be opened, and that the northern and southern sections of the cable might be joined in the neighbourhood of Iquique.

Permission to open through communication having been denied, the company employed the steamer Relay, an American vessel, to pick up and connect by a loop outside of the territorial waters the northern and southern sections of its cable. The act was performed

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in the open sea outside of Chilean territory. It was the lawful act of a private American company performed through the agency of a private American steamer. The U.S. ship Baltimore was present when the act took place. Her presence was not due to any specific order of the Department, no orders having been given upon this subject other than the general instructions of the 4th March, the provisions of which are as follows:—

"Take whatever measures are necessary to prevent injury by insurgent vessels to lives or property of American citizens, including American telegraph cables."

The act was in no way the act of the United States Government, but it was the act of the cable company in the execution of its lawful right to protect and make available for use its own property.

Visit of Admiral Brown to Quinteros Bay.

The only other incident of importance in which the Navy has taken part was the visit of Admiral Brown to Quinteros Bay on the occasion of the landing of the revolutionary troops for their campaign against Valparaiso. How little there was in this incident to justify the extraordinary assertions that have been made in regard to it appears from the following report of Admiral Brown, now published for the first time, which gives a full description of the affair:—

"U.S. FLAG-SHIP SAN FRANCISCO, *November* 14, 1891.
"*At Sea, Lat.* 27° *N.*, 114° 22′ *W.*

"HON. SECRETARY OF THE NAVY,
"*Navy Department, Washington, D.C.*

Admiral Brown's Report.

"SIR,—On the 10th instant, at 3 P.M., when this ship was under way and steaming out of the harbour of Acapulco, Mexico, I received a cipher dispatch, the following being the translation of the same:

"'Did you invite any Chilean officers to accompany you on board the San Francisco to witness the landing of Chileans at Quinteros? Did you or any of the officers or your crew, on return on that occasion to Valparaiso, Chile, communicate information about what you saw to any person not connected with your vessel?

"'TRACY.'

"To the above message I replied:

"'Did not invite or take any Chileans. I invited foreign officers. Only German went. No one from this ship gave information. Full information about landing was known at Santiago and Valparaiso before I sailed at noon.

"'BROWN.'

"Before I left Valparaiso there were published and discussed many misrepresentations and falsifications bearing on my going to Quinteros,

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which I am satisfied emanated from the large English colony at Valparaiso as a part of their preconcerted plans for injuring all Americans in a commercial sense, as also to sustain and strengthen their well-known position with the many sympathisers with the insurgents.

"The subject was freely discussed by them during the time the insurgents were investing Valparaiso, and as soon as the city fell into their hands, and Congressionalist papers, which had all been suppressed by the Government, began to be issued, the subject was occasionally referred to. I was called a 'spy,' &c., by them. To all this I paid no attention, except on two occasions, to which I will refer later on.

"As explanatory to my telegram from Acapulco, I consider it proper that I should place on record the following detailed statement in connection with the subject referred to.

"At 9.30 A.M. on August 20 I went on shore, and, when near the intendencia, met Major Herara, of Vice-Admiral Viel's staff, who speaks English perfectly. On asking if there was any news, he replied that the opposition had landed in force at Quinteros at daylight, and that this fact was known to everybody.

"To verify this statement, I went immediately to the office of Vice-Admiral Viel, intendente of Valparaiso, and on meeting him he informed me that it was true that a landing had been made at Quinteros, and that he had informed the President. He gave me the names of all the ships of war, transports, and tugs, and said that about 10,000 men were in the expedition. I asked him if he was sure that a landing had been effected. He then detailed to me the facts that at early daylight that morning he had received a telephone message from the observer at the Valparaiso lighthouse reporting that a large number of vessels were entering Quinteros Harbour. Soon after this, and before 7 o'clock, he received a telegraphic message from the operator at Quinteros stating that the opposition were landing a large force, and giving the names of armed vessels, transports, and tugs, and saying that the operator would move his instrument back to a safe point about three miles distant, and when connected would report further.

"At about 8 o'clock the operator reported that the advance of the insurgent force was within a mile of his station, and that he would abandon it at once. At 9 o'clock (a half-hour before I had this interview with Viel) he had received a report from Vina del Mar, stating that the enemy was in sight on the high lands on the north bank of the Aconcagua River.

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"I asked the Admiral what the Government was going to do to oppose the advance of the insurgents. He said that the Government forces had advanced, and that fighting would probably take place to the north of the Aconcagua River; that the insurgents would be attacked and driven back to their ships at Quinteros. He allowed me to look at the maps, and pointed out the location of the insurgents at that time, and the routes which the Government troops would take. I then asked Admiral Viel if this information was to be considered confidential, and he said, 'No, it is known to every man, woman, and child in Valparaiso and Santiago.' (This statement of Admiral Viel was subsequently, at my request, repeated by him in the cabin of the German flag-ship Leipzig, in the presence of Rear-Admiral Valois of the German Navy, and Captain Sampson of this ship.)

"I left the intendencia and walked several squares along the principal street, returned to my boat, and came on board shortly after 10 o'clock. On the street and in the plaza I met several acquaintances, including the United States consul, Colonel McCreary, and by everyone was told of the landing at Quinteros. As I neared the landing long lines of railroad cars were being loaded with troops, and some trains had started for Vina del Mar.

"On coming on board I sent an officer to the German and French admirals and to the senior English naval officer, and informed them that I would get under way about noon, go to the vicinity of Quinteros and return that evening, and that I would be happy to take any officers with me.

"They all knew of the landing having been made. Only one officer, a German lieutenant, came on board to accompany me, and he was the only person who went to Quinteros with me who did not belong to this ship.

"I never even intimated that I would take a Chilean with me, and most certainly would have declined to do so had any one of that nationality applied.

"We got under way a few minutes after noon (the engine-room log showing that the engines were started ahead at 12.30 P.M.) and steamed to Quinteros, a distance of eighteen miles. We made a turn around the bay and returned to Valparaiso, where we anchored at 4.50 P.M.

"Both going and returning, we passed two of the insurgent ships, which were under way and evidently on picket duty, and which were in sight from Valparaiso. I did not communicate with these ships nor with any one at Quinteros, because I knew if I did so that it

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would be said in Valparaiso that I had given information to the Congressionalists.

"While returning from Quinteros, I had cipher messages gotten ready for the Department and for Captain Schley of the Baltimore, who was then at Coquimbo. My message to you reported the landing at Quinteros; that to Captain Schley ordered him to proceed to Valparaiso with despatch. These messages were taken on shore by an officer as soon as we anchored (he reached the landing at about 5.10 P.M.), and he had to go to Admiral Viel to have my message to you viséd by him, and to get him to send the one for Captain Schley by the Government land line, which was then the only means of telegraphic communication with Coquimbo. My cablegram to you had to be viséd by the intendente, as the Government agent at the cable office would permit no messages sent that had not received the 'visto bueno' of the intendente.

"The officer returned on board very promptly, and gave me additional information of the movements of the two opposing armies, and by far more than any one on board of this ship could have imparted, as all we knew was that the insurgents had landed, and that the great majority of them had advanced towards the Aconcagua River, which is just twelve miles from Quinteros, and which the main body must have reached before we anchored at Valparaiso, as ten hours had elapsed since their landing.

"When in Santiago, on the 10th of September, I was told by our minister, Mr. Egan, Colonel Spooner, and Mr. Demorest, that before 11 o'clock on the forenoon of August 20 (the day of the landing) they knew of the landing, and that it was known to everybody on the streets.

"The two occasions on which I referred to the abusive and utterly false accusations, which were repeated in the English clubs and mentioned in the papers, were, first, when I called on Admiral Montt, President of the Junta Government, at Valparaiso, on the afternoon of August 29, the day after the fall of the city, when I told him of the remarks that had been made by people in Valparaiso about my going to Quinteros. I told him what I had learned before starting, and of all the information I had obtained, and was particular in explaining to him and impressing on him that what I told him was not in any way to be considered in the light of an apology, but only in order that he should be in possession of all the facts.

"The second occasion of my referring to this subject was on September 6, in a personal letter to our minister at Santiago,

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Mr. Egan, in reply to a personal note from him of the day previous. I replied at once in a personal letter to Mr. Egan, and gave him in substance the facts I have stated above relative to my trip to Quinteros.

"My letter was published in several of the Santiago papers (which are generally read in Valparaiso); but that part of my letter which stated that I informed Admiral Montt that I had done nothing to apologise for was left out.

"In this connection I would state that during the time this ship and the Baltimore were in Chilean waters no official act or word on the part of any officer or man of the two ships could possibly have been construed as being in any way other than in the line of the strictest neutrality.

"I here state most emphatically that any report, no matter by whom made, relative to my visit to Quinteros Bay on the 20th of August last, which differs from the above statement, is an absolute falsehood, deliberately fabricated for the single purpose of discrediting American interests in Chile.

"Very respectfully, your obedient servant,

"GEO. BROWN,
"*Rear-Admiral U.S. Navy,*
"*Commanding U.S. Naval Force, Pacific Station.*"

It therefore appears that neither in the affair of the Itata, whose surrender was voluntarily determined on by the Provisional Government at Iquique, nor in the presence of the Baltimore when the agents of an American cable company spliced their cables on the open sea, nor in the visit of Admiral Brown to Quinteros Bay, was there any ground of offence given by the Navy of the United States to any person, party, or government then existing in Chile, nor was any assistance or encouragement of any kind rendered to what was at that time recognised by all the world as in fact the Government of the country. Yet it is impossible to account for the series of outrages perpetrated on the crew of the Baltimore on any other supposition than that those who concerted them were influenced by the calumnies which had been actively circulated, and that they were aided and abetted by a police guard which should have suppressed them. No charge or even suspicion of misconduct attaches to the men who, on the night of the 16th of October, endeavouring without weapons to defend themselves against an armed attack, were driven by the police to a Chilean prison because they wore the uniform of American sailors.

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Increase of the Navy.

The old wooden ships of the Navy have now practically passed out of existence. They no longer count even as a nominal factor in naval defence. The sole reliance of the United States to-day for the protection of its exposed seaboard is the new fleet. This has advanced slowly, but its development has been sure. It is a novel branch of industry, but there have been no failures thus far, and the outlook for the ships still in progress is satisfactory. It may fairly be claimed for the work of reconstruction in the future that it will not fall behind the measure of success attained up to the present time.

Commercial rivalry—In Pacific.

The course of events during the past year has shown anew the necessity of continuing the development of the Navy. The demands upon it have been constant, and they are constantly growing. The rapid extension of commercial relations has doubled the importance of our interests, especially in the Pacific. It was said a few years ago by a keen foreign observer: "Some day or other there will be a great rivalry of three or four nations in the Pacific for the commerce of those seas, and the country which has cultivated its strength with a view to that contingency will carry off a chief part of the prize." The rivalry has already begun, and the signs are evident on every hand of sharp competition.

In Western Hemisphere.

It is apparent that the mercantile competitors of this country are to-day enlarging their fields of activity with a more aggressive energy than ever before. No one can fail to observe the indications of a systematic effort to take advantage of the disturbed conditions now prevailing in many of the smaller states. In this movement naval ascendency plays a large part. The consequences are not far to seek. The establishment of complete commercial supremacy by a European power in any state of the Western Hemisphere means the exclusion of American influence, and the virtual destruction, as far as that state is concerned, of independent existence. With the great maritime powers it is only a step from commercial control to territorial control.

Importance of Nicaragua Canal.

If that most important agency in the commercial development of the United States, the Nicaragua Canal, were completed, the strategic situation would be largely modified. At the present time the two seaboards are so remote that each requires its separate system of naval defence. Each has its vulnerable points, and each has neighbours that are well prepared for offensive movements. There is a circle of insular fortresses facing our Atlantic seaboard,

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the sole object of whose existence is to maintain naval outposts at our doors. There are states in the Pacific, and not large states either, whose fleets are more powerful than any force that we could readily bring to meet them. To protect either seaboard, even when our present authorised fleet is completed, will involve stripping the other at a critical moment.

Public opinion desires efficient naval protection.

I believe that public opinion in the United States desires to see this country provided with an efficient naval protection. The press, which represents the best intelligence of the country, speaks on the subject with clearness and emphasis. It believes, and the country believes with it, that this protection is an obligation upon the national government. It does not believe that cities like San Francisco, Seattle, and Tacoma should be open to the attacks of a third-rate power, whose ships, by a sudden movement, may enforce contributions that would pay in advance the expense of a war. If anyone believes that such rapidity of movement is impossible, let him recall the circumstances under which the Esmeralda appeared in April last, without warning, close to the Californian coast, sending on the Itata to San Diego. As little does public opinion believe that the commercial seaports of the Gulf and the Atlantic should be unprotected from attack by any nation whose fortified harbours and fully-equipped naval dockyards are within forty-eight hours' steaming.

But it is not the sea-coast states alone that have a direct interest in naval efficiency. The prosperity of the whole interior depends upon the uninterrupted supply of the demands of a foreign market. If, when war comes, we are not in a position to protect the transportation of our food products, the foreign market will be closed. By the blockade of such great outlets as Galveston, New Orleans, and Mobile in the Gulf, and the Chesapeake and Delaware and New York on the Atlantic, the great industry of the interior will be paralysed.

Dobbin on Navy.

It was well said by a former Secretary of the Navy, Hon. J. C. Dobbin, of North Carolina, as long ago as 1854:—

"But who are interested in the Navy? It is not merely the citizen whose lot is cast along the coast, the wealthy merchant in our cities, the speculator in floating merchandise, but merchants, mechanics, planters, our countrymen all along the coast, up our rivers, beyond our mountains. The agricultural interest is as much benefited and protected by the Navy as any other. Every planter in every section is not more truly protected by the inclosure around his farm than by our 'wooden walls' which float around our coast."

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But it is repeatedly said that the United States should avoid war. This is a proposition to which every right-minded citizen must assent. No principle is more firmly established in our national policy, and the Federal officer who would involve this country in a causeless war would be a traitor to his trust. But war does not require the agreement of both parties; it may come upon us without our consent, and even against our will. If a hostile fleet should attack San Francisco to-morrow, war would exist as a fact, although it had not been declared by legislative enactment.

Weakness invites aggression.

Even if it were impossible to involve this country in war without its consent there are situations in which that consent would be given by a unanimous popular voice. There are outrages which cannot go unredressed; there are injuries to which no nation can afford to submit. Against such injuries the surest preventive is a strong national defence. To refer again to the words of the statesman whom I have just quoted:—

"Weakness invites aggression, and never inspires respect; while acknowledged strength and visible preparation command consideration, and are the true safeguards of peace."

There are elements of danger at all times for American interests, and at any moment these elements may be rendered tenfold more active by a European war.

Our situation as a commercial neutral between these mighty contestants, to some of whom our exports of beef and pork and grain and cotton will be a necessity, while to others they will become a main object of attack, is one for which we must make an adequate provision beforehand. The disastrous consequences of our position in 1805–1812, as an unarmed neutral between two unscrupulous belligerents, are well known. The direct losses alone, to say nothing of the indirect injuries, sustained by our merchants during that period amounted to a sum that would have built a Navy sufficient to have swept the ships of either one of our aggressors from the ocean. As was stated by the President of the United States more than fifty years ago:—

"The history of the late wars in Europe furnishes a complete demonstration that no system of conduct, however correct in principle, can protect neutral powers from injury from any party; that a defenceless position and a distinguished love of peace are the surest invitations to war; and that there is no way to avoid it other than by being always prepared and willing, for a just cause, to meet it."

Construction authorised.

At the last session of Congress the construction was authorised

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of only one new ship, cruiser No. 13. Allowing for the delays that usually occur, this ship will probably be ready for commission in about two years. The last of the other ships now under construction will probably be finished at about the same time, unless delayed by the want of armour. The building operations of the Navy under existing statutes will then come to an end, unless new constructions are authorised at the present session.

* * * * * * * *

Estimates for 1892.

The estimates for increase of the Navy for the coming year, including hull, machinery, armour, armament, and equipment, show a reduction of $5,300,000 below the appropriations for the current year, or $12,300,000 in place of $17,600,000. A much larger reduction will take place in the following year, which will substantially complete all the work in progress under existing authorisations of Congress. In view of the large reduction in current estimates, and the still larger reductions in the immediate future, it would seem that some new construction might properly and safely be authorised during the present session.

Battleships proposed of Indiana type.

After considering carefully the additions that have been hitherto made to the Navy, and its future necessities, the Department has reached the conclusion that there should be no departure from the policy pursued up to this time of building large armoured vessels. Ships of the type of the Indiana, now under construction, are undoubtedly the most powerful element of protection that this country can possess.

The main batteries of these ships, which form their most characteristic feature, throw at a single discharge a weight of projectiles of 6800 lbs., or over three tons, with a total energy of 210,000 ft.-tons; and the energy of the projectile from the 13-in. gun is sufficient to perforate 22 in. of steel at a distance of one mile. Their secondary batteries, comprising sixteen 6-pounders and four 1-pounders, discharge 330 projectiles per minute. In addition to her guns, each ship will have torpedo tubes so arranged as to give an all-round fire for the discharge of 18-in. torpedoes, each of which is charged with 250 lbs. of a powerful explosive.

It is only by the possession of ships of this type that the defensive strength of the United States can really be measured. We may have many medium-sized cruisers of 4500 tons or below, which perform useful service in time of peace in carrying the flag about the world, which give practical training to officers and men, and which perform important auxiliary service in war; but when opposed to armoured ships these vessels cannot be counted as an element of

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force. If it is conceded that we require a Navy strong enough to resist an attack of any state possessing two modern sea-going armoured vessels—and there are many such states that in every other respect are far behind this country—we must have a sufficient number of ships of this type ready to meet them upon either coast. Three such ships, the number that we have provided for up to the present time, are not enough to fulfil even this moderate requirement.

Success of type.

The success which has attended the development of the plans of the three ships of this type, now in process of construction, and the favourable recognition which the designs have universally received, both in this country and in Europe, justify the Department in urging that naval construction should continue upon substantially the same line. The efficiency of the type is beyond question. The cost of the ships, although considerable, is not great for the service they render. It would certainly be poor economy to build in their place second-class armoured vessels of the type of the Maine and the Texas, for example, which, though excellent ships for their size, are not large enough to accomplish the true object of a heavily armoured vessel.

One first-class ship would cost certainly one-fifth less than two of the smaller type, and yet have a comparative force so much greater that in an engagement *it would destroy them both without receiving material injury.* It is probable also that the cost of the larger ships will be reduced by the increased facilities which experience has given to our American shipbuilders, and by simplified methods in the manufacture of armour, and the Department therefore recommends that authority be giving at the coming session to build two new vessels of the Indiana class.

Cruiser of New York type.

The Department also recommends the early construction of a large armoured cruiser, similar in general design to the New York. This magnificent vessel, whose functions cover a far wider range than those of an ordinary cruiser, presents an extraordinary combination of great coal endurance, high speed, and efficient armour protection. When to this combination is added a main battery of six 8-in. rifles and twelve heavy rapid-fire guns, she becomes one of the most formidable vessels in our own or any other navy, and one that can be brought into use for any kind of service. With the exception of the three ships of the Indiana class, she is the most important element of defensive strength which this country now possesses.

Modern requirements necessitate large cruisers.

The tendency of naval construction all over the world, at the present time, in the matter of cruisers, is towards the construction of large vessels. This is caused by the necessity of uniting in a

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single vessel a battery composed of high-power guns of at least 8-in. calibre, associated with numerous rapid-fire guns; protection in the form of either vertical side armour or a protective deck, or both (as in the New York), sufficiently heavy at least to withstand the attack of the rapid-fire battery of an adversary; high speed; and, finally, great coal endurance.

The importance of the latter feature is emphasised by a report received within a week from Admiral Brown on board the flag-ship San Francisco. It appears that the actual coal endurance of that vessel, which had been estimated at 8333 knots, will not exceed 4412 knots with the best quality of coal and a clean bottom. With the same coal, good weather, and a foul bottom the coal endurance is reduced to 3650 knots. A like result has been experienced in all the English ships of this type.

It is impossible to fulfil the four requirements stated above, in a satisfactory manner, on a displacement much below that of the New York, and in many recent vessels projected abroad this displacement has been exceeded. To attempt to attain these qualities in a smaller vessel inevitably leads to the sacrifice of either the battery, protection, speed, or coal endurance.

No smaller cruisers proposed.

Passing from the class of vessels represented by the New York, in which the highest efficiency of the cruiser type is reached—in fact, which may be considered the best all-round vessel of any type—it appears that the construction of smaller cruisers or gunboats, of 3000 tons displacement and less, carrying a heavy battery, but few or no rapid-firing guns, with a light protective deck, moderate speed and small coal endurance, has ceased entirely. In the few vessels of this size that are being designed at present a battery composed entirely of rapid-firing guns of from 4 to 6 in. calibre is the essential feature, and this is combined with high speed. Whether an adequate coal endurance can be obtained in vessels of this size is not fully settled, and it is clear that they can have but little protection. Until this type is more fully developed and further information is gained as to its efficiency, the Department would not recommend an advance in this direction.

No gunboats.

It is to be noticed that these vessels differ essentially from those of the so-called gunboat class. Although the gunboats are handy and reasonably cheap for peace cruising, it is neither wisdom nor economy to build ships for peace cruising only. A vessel like the Petrel, which can only steam 12 knots under favourable circumstances, so far from being a help to any squadron to which it is attached, is a continuous source of weakness. The speed of a fleet is

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that of its slowest ship. If it were desirable to direct a force of cruisers rapidly upon a given point, and the exigencies of the service required that they should proceed there in company, the presence of the Petrel would nearly double the length of time required by the operation; and when the force arrived upon the scene of action, her want of speed would reduce her in battle to the condition of a mere target. Nor could any use be made of her in torpedo operations or in blockade.

Torpedo cruiser.

There is, however, a class of small vessels capable of performing successfully many of the duties now required of gunboats, which are known as torpedo cruisers. The characteristics of the torpedo cruiser are well defined: small size (about 800 to 1000 tons), light draught, a speed of 22 knots, adequate coal capacity, rapid-firing guns, and a powerful torpedo armament. It combines the ability to keep the sea of the gunboat, with the speed and formidable armament of the first-class torpedo-boat. It has many functions. Acting independently it is a sea-going torpedo-boat, a commerce destroyer, or a blockade runner, and can destroy an enemy's torpedo-boats, and in blockades its presence is indispensable. In action its duty is to destroy an enemy's torpedo-boats, to serve as the support of a torpedo-boat flotilla, and to act as a torpedo-boat itself. This is the type of vessel that the Department would propose to build should Congress adopt its recommendation to increase the limit of cost in the vessel authorised by the act of June 30, 1890; and such a vessel would be a valuable addition to the naval force.

Vessels for river service.

For river service on the Asiatic and South Atlantic stations the Navy needs urgently four small vessels of special design. . . . For this purpose I recommend the construction of a vessel specially adapted for river service, but so constructed as to be capable of the highest military efficiency in the quarter where she is intended to operate. Several types have been proposed for the service. One of the best would be a vessel of about 1200 tons displacement and having a speed of not less than 17 knots. She should be 230 ft. long by about 40 ft. beam, and her maximum draught should not exceed 9 ft. The necessity of light draught is emphasised by recent experience. The town of Ichang, the scene of one of the late Chinese riots, could not be reached by any gunboat in the foreign fleets: all of them drew too much water.

Torpedo-boats.

Until recently the Department could not urge the necessity of torpedo-boats, being without any torpedoes with which to arm them. As stated elsewhere, this defect is now remedied, and with the domestication of the manufacture of the Whitehead torpedo, there is

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no reason why the construction of these necessary vessels should be longer delayed.

The construction of torpedo-boat No. 2 at Dubuque, Iowa, represents a new and important step in the development of the resources of this country for purposes of naval shipbuilding. Hitherto this work has been done almost wholly on the Atlantic and Pacific seaboards. Many rolling mills and shops in the interior, especially in Pennsylvania, Ohio, and Illinois, have performed a share of the work, but the shipbuilding has been done on the coast. The construction of a torpedo-boat on the Upper Mississippi, however, opens up great possibilities for development in this direction in the heart of the country.

It should be our policy in the building of our Navy to create, as far as possible, an equal distribution of benefits, and to promote manufacturing industries and the employment of working men in all parts of the country. The interior has also a distinct advantage over the coast, in that it is far removed from any possible attack to which our sea-coast establishments, private and public, would be peculiarly vulnerable.

PERSONNEL.

It is false economy to put in our new vessels all that is most advanced in high-pressure machinery and the multitude of engines and devices by which steam and mechanical appliances are made to do the work of man, and then to provide an insufficient number of officers to control them.

In reference to the line officers, the report of the Phythian Board, transmitted herewith, is commended to the careful attention of Congress.

Stagnation in promotion.

Among the causes of the present stagnation the most noticeable is the fact that in those classes which entered the Naval Academy during and immediately after the Civil War, the numbers actually on the list are far in excess of those which would be found in a normal condition of the service. While the eight classes entering the service during the years from 1852 to 1859 are represented to-day on the Navy Register by fifty-two officers, the succeeding period of eight years, from 1860 to 1867, is represented by 310 officers. Allowing for the larger numbers naturally to be found among the younger men, the normal strength of these classes should be 180.

Remedies proposed by Phythian Board.

The first measure proposed by the Board is to reduce the Navy list to a normal condition, with a fair distribution of officers of different ages throughout the different grades, so that there shall

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be a suitable correspondence between length of service and rank. A slight modification is made in the numbers assigned to the different grades, but retaining the same total on the active list as at present. It is proposed that a board of competent officers shall be convened to nominate for the grades in the active list of the new organisation the best officers of the Navy, keeping the present order of seniority among those so chosen, but filling the grades from the top down as far as the selected names will go. From among those not selected a reserve list is to be formed composed of officers qualified for shore duty, who would be so employed at the discretion of the Department, but whose promotion would cease immediately upon their transfer to the new list.

Those who are nominated neither for the active list nor for the reserve list would be retired at once. Vacancies occurring in the active list, after that list had been formed, would continue to be filled as at present, by graduates from the Academy, all of whom would be required to serve as ensigns for three years. The vacancies created by transfers to the reserve list would be gradually filled by admitting ten additional graduates a year, thereby keeping the total list at about its original numbers.

The list having been reorganised, the Board sets forth three principles as the basis of its further recommendations: First, that the object of any system of promotion should be to produce efficient commanding officers; second, that the officer should not be promoted to flag rank or command rank unless he has a certain period of service before him; and third, that final compulsory retirement should be based on length of service rather than upon age, as at present.

To carry out the first two of these principles, the Report recommends the following system of selection in making promotions to the two grades which represent respectively flag and command rank. From the head of the list of captains a number of officers, equal to twice the number of vacancies in a given year, is considered as eligible for promotion, and from this number the best are chosen by the Board to fill the vacancies. Their relative rank remains the same as before, but no captain is to be promoted unless he has five years still to serve before retirement. Captains whose names have been twice considered without having been selected for promotion, or who have reached a period of forty-one years of service, retire as captains. A similar plan is adopted in promotions from lieutenant-commander to commander, the necessary period of service in prospect being eighteen years instead of five.

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Recommendations of Department.

With many of the features of the Board's plan the Department is fully in accord, but it finds others that are open to serious objection. It believes that a scrutiny similar to that suggested in the Report is advisable; but it is strongly of the opinion that, before the scrutiny takes place, an opportunity should be given to those officers who may so desire to make, as a voluntary step, the transfer which the scrutiny contemplates. I would recommend that this should be done in three ways: First, by allowing all officers who are veterans of the war to retire on their own application, with advancement to the next higher grade; second, by allowing all officers who have passed more than fifteen years in one grade to retire on their own application, with advancement to the next higher grade; third, by allowing all officers having twenty years or more of service to go upon the reserve list on their own application, without further promotion, and subject only to shore employment.

These three measures will secure, first, an honourable retirement in the nature of a well-earned reward for those whose services have been most meritorious; second, the advancement of one step for those who have suffered injustice by reason of long-delayed promotion; and third, it will enable such officers as prefer it to go of their own option upon the reserve list, thus exchanging the benefits of promotion and increased pay for the benefits of shore duty. These measures will also accomplish a considerable part of the necessary reduction of the list by a voluntary instead of a compulsory transfer.

After these voluntary transfers are completed the scrutiny should be held and the selection made, not, as proposed by the Board, of the best officers of the Navy, which is a somewhat invidious ground of distinction, but of those officers *best fitted for sea duty*. The new active list will then include only officers who are fit to go to sea, who want to go to sea, and who mean to go to sea, and they are the only officers who are entitled to promotion. It should also be provided that the numbers selected for this active or sea-going list should comprise not less than 85 per cent. of the total number remaining after the voluntary transfers had been made. The large number of vacancies thus made at the foot of the new active list should not be filled at once, but only as casualties occur in the original body of officers composing both the active and reserve lists.

In reference to the question of selection, the Department believes that a limited application of the principle of selection in place of seniority as the basis of promotion is a necessary feature of any

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successful plan. It has been tried for many years in the Army, and has been found to increase its efficiency in a high degree. It may be that the officers selected for the positions of general officers in the Army are not always the best in the service, but they are never bad or incompetent. There is no reason why the system should not work equally well in the Navy, or why this branch of the service should be placed relatively at such a serious disadvantage. No system can be considered sound or reasonable which assumes, as does the present system of seniority promotion, that every individual who graduates from the Royal Academy is just as well fitted as any other for positions of high responsibility and command. Its defects have again and again been pointed out by my predecessors, and a change has been repeatedly advocated in the interest of economy and efficiency.

Enlisted Men.

In the Annual Report for 1889 the condition of the enlisted men was fully discussed. I desire to renew the recommendations made at that time, and especially that the number of apprentices be increased from 750, as now allowed by law, to 1500. The measures proposed two years ago for the purpose of securing a more permanent class in the corps of enlisted men are again recommended, and it is strongly urged that the principle be adopted of retaining the services of the men for life by substituting a plan of continuous service for the present method of temporary enlistment. The Department believes that for emergencies a four years' term of enlistment should be adopted, and recommends that the laws relating to honourable discharges after three years of service, and to allowances upon a three years' re-enlistment, be amended accordingly.

Naval Militia.

In my first Annual Report I called attention to the great importance of a trained militia for the Navy, and the advantages that would result from such an organisation both to the regular service and to the country at large.

The subject was further discussed in the Report of last year, and it was recommended that an appropriation should be made by Congress for the supply of arms in the same manner as had been done for many years for the land militia. It was predicted at the time that if such an appropriation were made the creation of the naval militia by the States would be assured.

In pursuance of this suggestion Congress, in the Naval Appropria-

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tion Act of March 2, 1891, appropriated $25,000 for the purchase of arms for the militia, to be expended "under such regulations as the Secretary of the Navy may prescribe." This sum became available on the 1st of July, and, in accordance with the terms of the Act, a circular was issued and sent to the governors of the several States. The regulations governing the distribution of the appropriation are as follows:—

"NAVY DEPARTMENT, *Washington, D.C., June* 20, 1891.

Regulations for Naval Militia.

"Under the authority conferred by the Naval Appropriation Act, approved March 2, 1891, in the following terms:—

"'NAVAL MILITIA: For arms and equipment connected therewith for naval militia of various States under such regulations as the Secretary of the Navy may prescribe, twenty-five thousand dollars,'—the following regulations are prescribed:

"(1.) Upon receipt of a return from the governor of any State of the number of men actually mustered in and serving in the naval militia of said State, on the 1st day of July, 1891, the Secretary of the Navy will allot to the State making the return, from the general appropriation for the naval militia, a sum equal to $12 per head for each officer and man so returned.

"(2.) The balance of the appropriation will be held in reserve until the 1st of October, 1891. Upon the receipt of a similar return on that date the balance will be allotted to the States then making returns, at the rate of $12 per head for every officer and man returned as actually mustered in and serving on that date in the naval militia of the State, in excess of the number returned on the 1st of July.

"(3.) Should the number in excess returned on the 1st of October be too great to admit of a distribution at the rate of $12 per head as prescribed in section 2, the balance remaining over from the July allotment will be distributed pro rata among the States making returns, according to the number returned in excess.

"(4.) Should a balance remain over after the allotment of October 1, provided for in section 2, it will be allotted pro rata to all the States having a naval militia, in accordance with the whole number of men returned by each State as actually mustered in and serving on that date.

"(5.) As soon as the allotments are made, in accordance with the above regulations, the amounts allotted will be credited to the States entitled thereto on the books of the Navy Department.

"(6.) Requisitions for arms and equipments will be made by the governors of States direct to the Secretary of the Navy, who will determine and order which of such arms and equipments, their number and character, shall be issued.

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"(7.) When a requisition is received at the Navy Department the Bureau concerned will be required to give the money value of the stores called for, and the Navy Department will determine and order which of the said stores, their number and character, shall be issued.

"(8.) All property issued upon requisition shall be accounted for under the regulations which now govern the accountability for public property in the Navy, and the Navy Department will issue the necessary instructions for the safe-keeping, preservation, inspection, and accountability thereof.

"(9.) The Navy Department will furnish the governors of the several States possessing a naval militia force with the necessary blank forms to carry out the provisions of the above sections. All returns shall be made to the Secretary of the Navy."

Cost of.

It was desirable that some part of the appropriation should be allotted on the 1st of July to those organisations that were already in existence. This amount was fixed at $12 per man actually mustered in and serving. As a stimulus to further activity the balance was reserved until the 1st of October, when a further allotment was made to those States whose forces had increased in the meantime, the final balance still remaining being apportioned among all the States having a naval militia organised at that date according to the numerical strength of the organisations.

The fund appropriated by law is not distributed directly to the States, but is applied, under the supervision of the Bureau of Ordnance, to filling requisitions for arms and equipment connected therewith, made by the governors of the several States, in the same manner as the appropriation for the land militia in charge of the War Department.

The result of the three allotments made from the returns received on July 1 and October 1 was as follows:—

California	$8,094.43
New York	7,461.71
Massachusetts	5,123.93
North Carolina	2,203.60
Rhode Island	1,178.16
Texas	938.17

Numbers of.

The number of men certified as mustered in and serving in the the naval militia is as follows:—

California	371
New York	342
Massachusetts	238
North Carolina	101
Rhode Island	54
Texas	43
Total	1,149

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The naval militia, therefore, comprises to-day an effective organised force over 1100 men distributed among six States. From information received from various sources, it is beyond question that as soon as the necessary authority is given by enactment of their respective legislatures, other States will immediately establish organisations, and the number of men in the service will be largely increased.

An estimate of $25,000 has been submitted for continuing the arming of the militia; but it is earnestly hoped that Congress may see fit to increase this amount in order that this new and most important branch of the service may be placed on a substantial footing.

The Department has endeavoured to facilitate and encourage, by every means in its power, the training of the State organisations. With this object in view, and also partly to contribute to the training of the Navy itself, the squadron of evolution conducted drills for two successive weeks at Boston and in Long Island Sound for the militia organised in Massachusetts and New York, the two States most advanced in preparation.

The importance of this movement, which is destined to add to the reserve strength of the Navy a considerable force of militia, with all the advantages of thorough preliminary training, will be universally appreciated. It should be helped and forwarded in every possible way. The drills of the naval militia during the past year have shown how much can be accomplished in this direction by organisation and discipline. Under the command of capable officers, many of whom have had professional experience, the naval battalions have reached a high state of efficiency, and the establishment of the naval militia must be regarded as one of the important events in the record of our naval progress during the past year.

Employment of Labour at Navy-Yards.

Not the least important among the new and difficult problems that have confronted the present administration of the Navy Department, is that of the building and repair of modern steel ships and engines in the navy-yards. A part of the work of building new ships should be done at the yards, because the Government must always be in a position to be independent of private contractors; and all of the repair work must necessarily be done there. Until recently this work was confined to wooden ships. During the last administration some repairs had been made upon the Boston and the Dolphin, and

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shortly before its close the keel of the Maine was laid at New York; but, with these unimportant exceptions, nothing whatever in modern shipbuilding or repairing had been done by the Government navy-yards prior to March 1889.

The Navy Department was therefore called upon, at the opening of this administration, to start on its own account a new manufacturing business—the construction and repair of steel ships.

* * * * * *

The question has been: How shall the Navy Department get good foremen and good workmen in its building and repair yards? . . . .

* * * * * *

Reorganisation necessary.

It became evident to me, after two years' experience in the Department, that in order to obtain the kind of workmen required in the navy-yards a specific change of organisation was necessary, and a plan for the selection of foremen and other superintending mechanics was put in operation in April last. All the superintending positions at the yard were declared vacant, and a board of officers, whose impartial character was universally recognised, and whose members were practical men, most of them experienced in manufacturing, was appointed to find out the best mechanics to fill the places. Public notice was given, and all mechanics were allowed to compete.

Steps taken.

The Department appointed in every case the man whom the Board reported as best among the applicants for the position. In some cases the Board reported that none of the candidates who appeared were qualified. In these cases, the best among the candidates was appointed temporarily, and the Department is now making a second effort to secure thoroughly competent men in their places.

The next step was to provide for the selection of workmen. The method adopted, which was put in operation on the 1st of September last, was to open an office at each yard, where all applicants could register. This office is in charge of a Board, also composed of practical men, either heads of departments at the yards or their assistants, all of whom are commissioned officers.

The Board classifies the applicants according to their trades, the only requirement for registration being that they shall be American citizens, and that they shall bring certificates from previous employers that they know their trade. When workmen of any particular trade are needed in any department of the yard, the head of the department makes a requisition on the Board. The Board sends in a list of names, taking them in the order of their application, but giving

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preference to those who have had experience in navy-yard work. The head of the department, on receiving the names from the Board, takes the same course that would be followed by the superintendent of a private establishment. He sets the men to work and finds out their fitness for employment, grading them according to their skill if they are good workmen, and if they are not, rejecting them altogether.

Every man whose name is sent to him by the Board must have a trial. It may be a short trial, but the superintendent must try him and come to a conclusion about him. When he rejects men he sends their names back to the Board, and new names are supplied until he obtains the mechanics he needs. The registration books, as well as the reasons for rejection in each case, form a permanent record, which enables the Department to maintain an effective supervision and to see that no favouritism is practised.

The above system may not be the best that can be devised, but it is the best that has so far presented itself, and if any one can suggest an improvement on it the Department will be ready to adopt it. It is practically the same system that prevails in any great manufacturing establishment. In such an establishment employment is not governed by personal considerations of any kind. It is a question of good work on the one hand and of dollars and cents on the other. The Navy Department, as far as its manufacturing business is concerned, stands on the same footing. It proposes to obtain efficiency of work, and thereby secure economy of cost; and as efficient work requires mechanics of high skill, it proposes to select and retain only such workmen as can show that they have the required skill by actual trial.

It has always been recognised that the cost of work in the navy-yards was greater than in private yards. I believe that this difference should not exist, and that, by the application of a proper system, it may be corrected. That the recent change in organisation will be a long step in that direction I do not doubt.

* * * * * *

Political considerations excluded.

In reference to the exclusion of political considerations from navy-yard employment which the recent orders have brought about, I deem it proper to call attention to the following statutes, by which the administration of the navy-yards is placed on a footing distinct from every other Department of the Government:—

"Sec. 1544. Labour shall be employed in the several navy-yards by the proper officers in charge with reference to skill and efficiency, and without regard to other considerations.

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"Sec. 1546. No officer or employé of the Government shall require or request any working man in any navy-yard to contribute or pay any money for political purposes, nor shall any working man be removed or discharged for political opinion; and any officer or employé of the Government who shall offend against the provisions of this section shall be dismissed from the service of the United States."

The head of this Department is as much bound by the above laws as by any other on the statute book; and whatever method is adopted to carry them out, he has no choice but to see that they are faithfully executed.

Cost of the New Navy.

In accordance with the provisions of the Naval Appropriation Act of March 2nd, 1891, the following table is submitted. In examining this statement (given on pp. 494–96) it will be seen that the cost of building the new ships of the Navy, excluding tugs, from beginning to final completion, covering operations from the fiscal year 1883–84 to 1894–95, aggregates, during the twelve years, a total of $69,993,382, or considerably less than $6,000,000 a year. The vessels included in this statement are forty in number, with an aggregate tonnage of 155,820 tons.

When it is considered that at the time of beginning the first four cruisers not a single steel ship had been built in this country, that no vessels either of steel or of iron had been constructed by the Navy since the war, with the exception of three small third-class iron gunboats built in 1874, and that the whole work upon these ships represented practically a new branch of manufacture, the stupendous character of the results accomplished may be appreciated. For the mechanical work actually done, the figures are reasonable; while the moral result, which has been to raise this country from a position of absolute defencelessness to that of a respectable naval Power, has been out of all proportion to the annual charge upon the revenues. No other expenditure of the Government, of equal amount, during the period has been more productive of benefit than that which has been devoted to the construction of an American Navy, out of American materials, and by American labour.

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STATEMENT showing the NAME and TONNAGE of each UNCOMPLETED VESSEL authorised to be BUILT since March 4, 1885; when BEGUN, the probable date of its COMPLETION, COST OF CONSTRUCTION (including ARMOUR, ARMAMENT, and EQUIPMENT), to June 30, 1891; with ESTIMATED AMOUNT required for COMPLETION, to include ARMOUR, ARMAMENT, and EQUIPMENT.

[NOTE.—This statement does not include premiums that may be earned, as the amount of such premiums is wholly speculative.]

NAME.	Tonnage.	When begun.	Probable date of completion.	Total amount expended upon construction, including armour, armament, and equipment.	Total estimated amount required for completion, including armour, armament, and equipment.	Total cost.
				$	$	$
Maine	6,648	Nov. 5, 1887	1893	1,775,970.75	1,773,071.00	3,549,041.75
Texas	6,300	Nov. 8, 1887	1894	1,136,434.29	1,866,258.00	3,002,692.29
Monterey	4,048	June 14, 1889	1892	1,368,563.78	1,227,523.00	2,596,086.78
New York	8,150	Aug. 28, 1890	1893	1,410,102.07	2,628,306.00	4,038,408.07
Cruiser No. 6	5,500	July 10, 1890	1893	426,219.43	1,961,750.00	2,387,969.43
Cincinnati	3,183	Sept. 26, 1889	1893	571,579.36	1,261,809.00	1,833,388.36
Raleigh	3,183	" "	1893	628,083.74	1,014,832.00	1,642,915.74
Cruiser No. 9	2,000	Nov. 2, 1889	1892	353,540.92	497,910.00	851,450.92
Cruiser No. 10	2,000	" "	1892	352,492.18	501,663.00	854,155.18
Cruiser No. 11	2,000	Nov. 11, 1889	1892	296,130.67	625,001.00	921,131.67
Gunboat No. 5	1,050	April 12, 1890	1892	130,982.24	343,754.00	474,736.24
Gunboat No. 6	1,050	" "	1892	128,551.90	344,454.00	473,005.90
Harbour Defence Ram	2,050	Jan. 22, 1891	1892	6,170.14	1,408,388.00	1,414,558.14
Indiana	10,200	Nov. 19, 1890	1894	27,903.01	5,493,349.00	5,521,252.01
Massachusetts	10,200	" "	1894	28,405.96	5,493,349.00	5,521,754.96
Oregon	10,200	" "	1894	27,956.95	5,662,909.00	5,690,865.95
Cruiser No. 12	7,400	" "	1893	512,975.86	2,636,239.00	3,149,214.86

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Torpedo Boat No. 2	112	Oct. 8, 1891	1892	.. ..	136,850.00	136,850.00
Cruiser No. 13	7,350	Aug. 31, 1891	1894	3,298.80	3,101,057.00	3,104,355.80
Puritan *a*	6,600	June 26, 1889	1893	192,769.82	1,582,054.00	1,774,823.82
Monadnock *b*	3,990	Mar. 26, 1890	1893	399,060.87	1,113,237.00	1,512,297.87
Amphitrite *c*	3,990	Aug. 30, 1889	1893	330,240.16	887,783.00	1,218,023.16
Terror *d*	3,990	April 25, 1889	1893	505,626.74	896,659.50	1,402,286.24
Miantonomoh *e*	3,990	Aug. 13, 1887	1891	777,906.89	71,110.00	849,016.89
Total	..	.. ..	..	11,390,966.53	42,529,315.50	53,920,282.03
Practice cruiser	838	July 18, 1890	1892	62,794.71	273,951.00	336,745.71
Tugboat No. 1	192·4	Dec. 20, 1890	1892	11,677.68	25,210.32	36,888.00
Tugboat No. 2	192·4	„ „	1892	11,677.68	25,210.32	36,888.00
Tugboat No. 3	192·4	„ „	1892	11,677.68	25,210.32	36,888.00
Total	..	.. ..	..	35,033.04	75,630.96	110,664.00
Grand total	..	.. ..	..	$11,488,794.28	42,878,897.46	54,367,691.74

The cost of the Monitors stated in this Table includes the expenditures incurred subsequent to the passage of the acts authorising their reconstruction, namely, of August 3, 1886, for the Puritan, Monadnock, Amphitrite, and Terror, and of March 3, 1887, for the Miantonomoh. The expenditures prior to these dates are as follows :—

	$
a Expenditures made prior to August 3, 1886	981,762.46
b Expenditures made prior to August 3, 1886	622,705.87
c Expenditures made prior to August 3, 1886	577,231.67
d Expenditures made prior to August 3, 1886	599,850.53
e Expenditures made prior to March 3, 1887	1,482,900.79
Total	$4,264,451.32

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STATEMENT showing the NAME and TONNAGE of each VESSEL that has been completed since March 4, 1885; when BEGUN, and when COMMISSIONED; its entire COST of CONSTRUCTION, including ARMOUR, ARMAMENT, EQUIPMENT, and PREMIUMS, and its COST for REPAIRS since completion.

Name.	Tonnage.	When begun.	When commissioned.	Cost of construction.	Armament.	Outfit under steam engineering, construction, and equipment.	Special reservations and other outstanding obligations unpaid June 30, 1891.	Premiums.	Total cost of construction, including armament, equipment, and premiums.
				$	$	$	$	$	$
Chicago . .	4,500	July 26, 1883	Apr. 17, 1889	1,183,629.21*	292,257.50	111,936.71	..	..	1,587,823.42
Atlanta . .	3,189	July 23, 1883	July 19, 1886	700,000.00*	177,912.75	95,480.99	..	..	973,393.74
Boston. . .	3,189	do.	May 2, 1887	700,000.00*	178,280.89	88,248.45	..	..	966,529.34
Dolphin . .	1,485	do.	Dec. 8, 1885	350,000.00*	34,278.79	37,715.68	..	..	421,994.47
Newark . .	4,083	Oct. 27, 1887	Feb. 2, 1891	1,309,430.89	169,448.22	115,695.80	68,419.12	36,857.70	1,699,851.73
Charleston .	4,044	Dec. 28, 1886	Dec. 26, 1889	1,164,504.10	181,954.05	121,500.55	..	..	1,467,958.70
Yorktown. .	1,700	Jan. 31, 1887	Apr. 23, 1889	480,242.65	114,247.78	60,095.36	..	39,825.00	694,410.79
Petrel . . .	890	Dec. 22, 1886	Dec. 10, 1889	307,996.55	51,280.37	70,033.79	..	..	429,310.71
Baltimore. .	4,600	Dec. 17, 1886	Jan. 7, 1890	1,426,504.93	209,294.92	118,446.91	..	106,441.80	1,860,688.56
Vesuvius . .	725	Feb. 11, 1887	June 7, 1890	317,555.33	..	8,020.40	..	..	325,575.73
Cushing . .	116	Mar. 1, 1888	Apr. 22, 1890	98,666.29	..	1,809.95	..	..	100,476.24
Philadelphia .	4,324	Oct. 27, 1887	July 28, 1890	1,399,336.19	196,298.62	98,386.04	25,000.00	100,000.00	1,819,020.85
San Francisco	4,083	Oct. 26, 1887	Nov. 15, 1890	1,607,642.57	183,471.70	120,233.81	..	100,000.00	2,011,348.08
Concord . .	1,700	Nov. 15, 1887	Feb. 14, 1891	529,362.14	81,888.42	66,458.55	26,939.19	..	704,648.30
Bennington .	1,700	do.	June 20, 1891	487,798.41	80,328.11	51,429.76	53,767.63	..	673,323.91
			Total. .	12,062,669.26	1,950,942.12	1,165,492.75	174,125.94	383,124.50	15,736,354.57

* Cost and valuation by appraisement June 29, 1889 (and including in the case of the Chicago $33,629.21 additional expenditures for completion since appraisement).

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ESTIMATES AND APPROPRIATIONS.*

The general estimates for the support of the Navy, including public works and the Marine Corps, which were sent in last year, showed a reduction, as stated in the report of that year, of over $1,000,000 below the estimates of the previous year.

The estimates for the same purpose herewith transmitted show a further reduction of $241,053 below the estimates of last year, and a reduction of $5,360. 98 below the appropriations for the current year.

The present estimates for increase of the Navy show a very large reduction below the appropriations for the current year, the amount being $12,280,855, against $17,607,000 in the last appropriation, a reduction of $5,326,145.

The total estimate for the Navy, including both running expenses and "increase of the Navy," is $27,194,639. 80, as against the appropriation of $32,526,145. 78 of last year, being an aggregate reduction in current estimates below the last year's appropriation of $5,331,505. 98.

The appropriations for the increase of the Navy since July 1889 have been unusually large as compared with those of previous years. As was indicated, however, in the report of last year, the necessity for these appropriations has been due to the fact that the burden has fallen upon these years of carrying a part, and in some cases by far the largest part, of the construction of every vessel which has been authorised by Congress since 1884.

DRY-DOCK COMMISSION.

The commission, to which allusion was made in my last annual report, of which Capt. F. M. Bunce, U.S.N., was President, designated by an executive order of November 22, 1891, in pursuance of a clause in the Naval Appropriation Act of June 30, 1890, to select a suitable site, having due regard to commercial and naval interests, for a dry dock at some point on the shores of the Gulf of Mexico or the waters connected therewith, organised December 5, 1890, completed the duty required, and on the 9th of March last, made their report, which has been recently transmitted to you.

* See page 498.

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Comparative Exhibit of Estimates and Appropriations, 1892 and 1893.

Detailed objects of Expenditure and Explanations.	Appropriations for 1892-93 (current Year).	Estimates, 1893.	Total.
General Establishment—	$	$	$
Pay of the Navy . . .	7,300,000.00	7,350,000.00	
Pay miscellaneous . .	240,000.00	240,000.00	
Contingent Navy . .	7,000.00	7,000.00	7,597,000.00
Bureau of Yards and Docks—			
Ordinary Expenses . .	680,412.37	718,794.04	
Public Works . . .	769,137.95	469,659.38	1,188,453.42
Bureau of Navigation—			
Ordinary Expenses . .	148,000.00	131,750.00	
Naval Academy . . .	213,073.45	207,688.65	339,438.65
Bureau of Equipment. . .	994,025.00	..	1,034,225.00
Bureau of Ordnance . . .	389,824.00	..	594,041.25
Bureau of Construction . .	1,044,972.50	..	1,019,972.50
Bureau of Steam Engineering .	712,900.00	..	763,105.00
Bureau of Provisions and Clothing	1,207,581.09	..	1,232,692.03
Bureau of Medicine and Surgery.	125,000.00	..	125,000.00
Marine Corps—			
Pay Department . . .	696,296.28	696,625.00	
Quartermaster Department .	254,234.14	263,906.28	960,531.28
Naval Observatory . . .	136,689.00	..	59,325.67
Total running Expenses .	14,919,145.78	..	14,913,784.80
Increase Navy—			
Bureau of Yards and Docks .	100,000.00	110,000.00	
Bureau of Equipment . .	400,000.00	600,000.00	
Bureau of Ordnance . .	4,000,000.00	4,186,250.00	
Bureau of Construction and Repairs . . . / Bureau of Steam Engineering	13,107,000.00	7,384,605.00	12,280,855.00
Total increase Navy .	17,607,000.00	..	
Grand total . .	32,526,145.78	..	27,194,639.80

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Revenue Marine Service.

The Department again refers to its recommendation, made for two successive years, in favour of legislation consolidating the Revenue Marine Service with the Navy. The advantages of this change are so marked and have been so fully stated in previous reports of Secretaries of the Navy, that it is unnecessary to repeat them here. The measure is advantageous from every point of view, and is again earnestly commended to the attention of Congress.

B. F. Tracy,
Secretary of the Navy.

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XVII.

NAVAL BIBLIOGRAPHY, 1891.

Compiled by W. LAIRD CLOWES.

THE following are the more important books on Naval subjects that have appeared in Great Britain and abroad during the year 1891. Publishers' names and, in most cases, prices are appended, together with occasional notes on the contents :—

WORKS OF GENERAL REFERENCE.

Amtliche Liste der Schiffe der deutschen Kriegs- und Handelsmarine. (Georg Reimer, Berlin.) 1 mark. A list, prepared in the German Ministry of the Interior, with ships' signal numbers, &c., forming an appendix to the International Signal Book.

Annuaire de la Marine pour 1891. (Berger-Levrault, Paris.) 10 francs. The French Navy List.

Official Catalogue of the Royal Naval Exhibition, 1891. (W. P. Griffith & Sons, London.) 1s. Contains a copious chronological register of naval events, 1580–1891, introduction to each section, and full notes to many of the exhibits. (Five editions.)

L'Année Militaire et Maritime. By H. Barthélemy and L. Renard. (Librairie Mondaine, Paris.) 5 francs. A first annual issue.

Carnet de l'Officier de Marine, pour 1891. By Léon Renard. (Berger-Levrault, Paris.) 3 fr. 50 c.

Information from Abroad. The Year's Naval Progress, July, 1891. (United States Office of Naval Intelligence.) Not issued for sale. This is, as usual, one of the very best works of reference of the year.

Aide-Mémoire de l'Officier de Marine. By Edouard Durassier, Librarian in the French Ministry of Marine. (L. Baudoine et Cie., Paris.) 3 fr. 50 c.

Taschenbuch für die Kaiserliche Marine. By Lieutenant zur See Capelle. (Friedrich Luckhardt, Berlin.) 5 marks. A valuable compendium, issued by authority of the German Admiralty, of information concerning the German Navy.

Almanach der Kriegs-Flotten. (Gerold und Co., Pola and Vienna.) 2 gulden. Contains sketches of 134 ironclads.

Almanach für die k. u. k. Kriegs-Marine. (Gerold und Co., Pola and Vienna. 2 gulden. The well-known semi-official Austrian annual.

Eintheilung und Standorte des Heeres und der kaiserlichen Marine. (A. Batte, Berlin.) A semi-official statement of the strength and distribution of the German Army and Navy, revised and brought down to April 1st, 1891.

Eintheilung und Standorte des deutschen Reichsheeres und der k. Marine. Edited by Captain Ecke. (Max Kannemann, Kassel.) 1 mark. The second annual issue of a work similar to the preceding.

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Marines Etrangères. By H. Buchard. (Berger-Levrault, Paris.) 10 francs. A mine of information, extending over 636 pages, and illustrated with 30 plates of uniforms.

The Service Almanack, for the Army, Navy, and Auxiliary Forces. (Harrison and Sons, London.) 1*s.*

The Nautical Almanack. (Pewtress, London.) Published annually several years in advance.

The Royal Navy List. Edited by Lieut.-Col. F. Lean, R.M. (Witherby, London.) Quarterly 7*s.* 6*d.* With valuable biographical notes.

The Navy List. (Darling and Son, London.) Monthly 1*s.* 6*d.*; Quarterly 3*s.* Issued by authority of the Admiralty.

The War Ships of the World. (Lloyd's Register, London.) 5*s.* Statistical information concerning all navies, with valuable information about docks, ships, and merchant vessels suitable for use as cruisers.

History and Criticism.

Naval Warfare: Its Ruling Principles and Practice Historically Considered. By Rear-Admiral P. H. Colomb. (W. H. Allen and Co., London.) 21*s.* The most important English work of the kind that has appeared in recent years. It deals exhaustively with the nature of war, the struggle for the command of the sea, the differentiation of naval force, &c.

Die k. u. k. österr. Kriegsmarine in dem Zeitraum von 1797 *bis* 1848. By J. Ritter von Lehnert. (Gerold und Co., Pola and Vienna.) 4 gulden. This forms the second part of the History of the Austrian-Hungarian Navy, and is at present complete only to 1802. It treats of the Austro-Venetian Navy from 1797 to 1802, and is illustrated with 4 maps.

Admiral Prinz Adalbert von Preussen. By Vice-Admiral Batsch. (Brachvogel und Ranft, Berlin.) 4 marks 50 pf.

Idées Maritimes d'Hier. By Comte de Gueydan. (Perrin et Cie., Paris.) 3 fr. 50 c.

The Development of Navies. By Captain Eardley Wilmot, R.N. (Seeley and Co., London.) 5*s.* One of the "Events of Our Own Time" series. It gives a succinct view of fifty years of naval progress, is fully illustrated, and is dedicated to the Queen. A chapter on Marine Propulsion is contributed by Fleet Engineer (retired) R. C. Oldknow, R.N.

Unsere Flotte: ein Beitrag zu ihrer Kenntniss und Wertbestimmung. By Ernst Lechner, one of the Imperial German Naval Constructors. (Lipsius und Tischer, Kiel.) 1 mark. A reply to the following,—

Unsere Marine in der zwölfsten Stunde. By ✠. (Lipsius und Tischer, Kiel.) 1 mark. A lively criticism of the fleets of Germany, Denmark, Russia, France and Great Britain.

Die deutsche Marine. (A. Toussaint und Co., Berlin.) 7 marks 50 pf. An album of coloured types of German war vessels.

La Marine Moderne. By Marc de Meulon. (Firmin Didot, Paris.) 4 fr. A useful work, with numerous illustrations on wood.

All About the Royal Navy. By W. Laird Clowes. (Cassell and Co., London.) 1*s.* Fact, criticism, and suggestion; with illustrations.

The Last of Nelson's Captains (Admiral Sir Wm. Parker, 1781–1866). By Admiral Sir Augustus Phillimore, K.C.B. (Harrison and Co., London.)

The Sea Service. By Commander C. N. Robinson, R.N., illustrated in colours after W. H. Overend. (Raphael Tuck, London.) 1*s.* A book which, apparently intended for children, is meritorious as being of great accuracy.

The Last Great Naval War: a Historical Retrospect. By A. Nelson Seaforth. (Cassell and Co., London.) 2*s.*

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A Chat about the Navy. By W. J. Gordon. (Simpkin, Marshall and Co., London.) 1*s.*

Le Siège de la Rochelle. By Vice-Admiral Jurien de la Gravière. (Firmin Didot, Paris.) 3 fr. 50 c. A volume of the admirable series on "Les Origines de la Marine Française et la Tactique Naturelle."

In a Conning Tower: or, How I took H.M.S. Majestic into Action. By H. O. Arnold-Forster. (Cassell and Co., London.) 1*s.*

Humorous Art: Broadsides: Naval Sketches: and Illustrated Sea Songs. By Joseph Grego. (W. P. Griffith and Sons, London.) 1*s.* Pictorial notes on caricatures, &c., that were at the Royal Naval Exhibition, 1891.

Life in the Royal Navy. By 'A Ranker.' (G. Chamberlain, Portsmouth.) 1*s.*

Real Sailor Songs. Collected and edited by John Ashton. (Leadenhall Press, London.) 21*s.* A very incomplete and unsatisfying, yet interesting and beautifully got up volume, with quaint illustrations.

Royal Naval Exhibition, 1891: *The Illustrated Handbook and Souvenir.* ("Pall Mall Gazette" Office, London.) 6*d.* Unauthorised by the Council of the Exhibition, but well illustrated and withal satisfactory.

Illustrated Souvenir of the Royal Naval Exhibition. By Joseph Grego. (Sampson Low, London.) 1*s.* A well-intended volume, which, however, is valuable only for its numerous illustrations.

Rodney. By David G. Hannay. (Macmillan and Co., London.) 2*s.* 6*d.* One of the "English Men of Action" series. With a portrait.

Die deutsche Marine in ihrer gegenwärtigen Uniformirung. (Ruhl, Leipzig.) 1 mark 75 pf. A collection of 270 illustrations of German naval uniforms.

Marine und kolonial Truppe. (Max Hochsprung, Berlin.) 4 marks. A collection of 25 coloured plates of uniform.

Die historische Entwickelung der Schiffstypen. (Lipsius und Tischer, Kiel.) 30 marks. A really excellent work, by the well-known marine artist, Lieutenant zur See L. Arenhold, on the development of the modern ship. With pictures of 30 examples reproduced by heliogravure.

Helgoland und die deutsche Flotte. By Captain Stenzel, Imp. Germ. Navy. (Carl Ulrich und Co., Berlin.) 75 pf.

H.M.S. Victory: Her History and Construction. By Captain C. Orde Browne, R.A. (retired), and H. J. Webb, Asst. Constructor, H.M.S. Dockyard, Portsmouth. (Office of "The Engineer," London.) 6*d.*

Zur Frage der Befestigung von Helgoland. By Rear Admiral R. Werner. (J. F. Bergmann, Wiesbaden.) 80 pf.

Der neue Seehafen bei Cuxhaven. By Captain Stenzel, Imp. Germ. Navy. (Ernst Toeche, Berlin.) 80 pf.

Her Majesty's Navy. By Lieut. C. R. Low, late Indian Navy. (Virtue, London.) Published to subscribers.

The Old Navy and the New. By Rear-Admiral Daniel Ammen, U.S.N. (Lippincott, Philadelphia.) 3 dollars.

The Defence of Charleston Harbour, 1863–66. (Walker, Evans and Co., New York.) With illustrations.

Les Guerres Navales de Demain. By Z. Montéchant. (Berger-Levrault, Paris. 3 fr. 50 c. With figures and plates.

La Lutte dans la Mer Adriatique en 1866. By F. Crousse, after the publications of the Austrian General Staff. With a biography of Tegetthoff. (C. Maquardt, Brussels.) 4 francs. With 2 charts and 6 illustrations.

Die Kampfmittel zur See. By B. von Werner. (Brockhaus, Leipzig.) 3 marks. With 93 illustrations.

Nautische Rückblicke. By Vice-Admiral Batsch. (Paetel, Berlin.) 9 marks.

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Prinz Heinrich von Preussen. By A. Langguth. (Niemayer, Halle.) 6 marks. A capital biography of the German Sailor-Prince.

Unser Marine. By C. W. Allers. (Wiskott, Breslau.) 30 marks. Fifty fine original drawings reproduced by a photographic process; with text.

Sir Francis Drake. By Julian Corbett. (Macmillan and Co., London.) 2*s.* 6*d.* A volume of the "English Men of Action" series. With portrait.

Sir John Franklin. By Captain A. H. Markham, R.N. (Philip, London.) 4*s.* 6*d.* A volume of "The World's Great Explorers" series. With maps and portraits.

HYDROGRAPHY, NAVIGATION, METEOROLOGY, SIGNALLING, &c.

Seamanship Examination Questions of the Training Squadron. By Lieutenant Thomas P. Walker, R.N. (Griffin and Co., Portsmouth.) 2*s.* A capital and suggestive selection of questions which have been actually put: interleaved for the insertion of answers.

Nautisches Jahrbuch; oder Ephemeriden und Tafeln für 1894. Edited by Herr Tietjen. (Heymann, Berlin.) 2 marks 50 pf. The German Nautical Almanac.

Conduite du Navire. By H. Bersier. (L. Baudoin, Paris.) 3 fr. 50 c. With 24 figures.

Flags National and Mercantile. By James Griffin. (Griffin and Co., Portsmouth.) 7*s.* 6*d.* The second edition, supplemented with 422 additional flags and funnels, of Mr. Griffin's useful illustrated register of ensigns, house-flags, &c., of the mercantile marines of all nations.

Gezeiten-Tafeln für 1892. (E. S. Mittler und Sohn, Berlin.) 1 mark 50 pf. Official tide-tables for the German Ocean, Channel, and Irish Sea, prepared by the German Hydrographical Department. With 14 lithographs.

Handbuch der Navigation. (E. S. Mittler und Sohn, Berlin). 5 marks. Third and improved edition of the German Hydrographical Department's text-book. With 18 lithographed tables and 107 woodcuts.

The Ocean: A Treatise on Ocean Currents and Tides, and their Causes. By W. Leighton Jordan, F.R.G.S. (Longmans and Co., London.) 21*s.* A second edition.

Die deutschen Seehäfen. By L. Friederichsen. (L. Friederichsen und Co., Hamburg.) 20 marks. This, the second part of the work, deals with the German North Sea ports.

Leuchtfeuer und Schallsignale der Erde. By W. Ludolph. (M. Heinsius Nachfolger, Bremen.) 7 marks 50 pf. A revision, up to date, of this useful work. With charts. Separate parts, varying in price from 50 pf. to 1 mark 20 pf., may be obtained.

Welt-Flaggenkarte. (E. Behre, Mittau.) 50 pf. Naval and commercial flags of all nations.

Deutsches Kriegschiffleben und Seefahrkunst. By B. von Werner. (Brockhaus, Leipzig.) 9 marks.

Nautica Stimata ad Uso dei Capitani Maritimi e degli Instituti Nautici. By Enrico Fileti. (Libreria Internazionale, Carlo Clausen, Palermo.) With numerous figures, &c.

Tables Condensées pour le Calcul Rapide du Point Observé. By Lieut. E. Serres, French Navy. (Gautier-Villars, Paris.)

Segel-Handbuch für die Ostsee. (Dietrich Reimer, Berlin.) Second edition.

Elements de Navigation et de Calcul Nautique. By J. B. Guilhaumon. (Berger-Levrault, Paris.) 12 francs. Two volumes with 153 figures and 2 plates.

Sammlung fünfstelliger logarithmischer, trigonometrischer und nautischer Tafeln. By W. Ligowski. (Paul Toeche, Kiel.) 6 marks.

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Gunnery, Torpedoes, Mines, Explosives, &c.

Modern Naval Artillery. (W. P. Griffith and Sons, London.) 5*s.* A book misnamed. It is merely an account of the Elswick exhibit at the Royal Naval Exhibition. It is very well illustrated and contains some useful tables.

Die gepresste Schiesswolle. By Fr. Plach. (E. Scharff, Pola.) 2 gulden. A survey, illustrated with 24 figures, of compressed gun-cotton as utilised for mines and torpedoes.

Artiglieria da Costa. (Enrico, Rome.) The third of the artillery manuals published under direction of the Italian War Office. It contains 244 figures, including about 70 of ships of war.

Machinery, Engineering, Steam, Fuels, &c.

The Marine Steam Engine: Its Construction, Action and Management. (Lipsius und Tischer, Kiel.) 80 marks. A translation, and third edition, by H. A. B. Cole, M.I.N.A., of the well-known work of Professer Carl Busley, of the German Naval Academy at Kiel.

Steam Boiler Construction. By Walter S. Hutton. (Lockwood and Sons, London.)

Marine Propellers. By Sydney W. Barnaby, M.I.C.E., M.I.N.A. (Spon, London.) 10*s.* 6*d.* A third edition, entirely re-written and much enlarged: with illustrations.

Fuels: Solid, Liquid, and Gaseous. By H. J. Phillips, F.C.S. (Lockwood and Sons, London.) A treatise for chemists and engineers on the analysis and value of fuel.

Aide-Mémoire du Constructeur de Navires, de Machines et Chaudières Marines. By B. Martinenq. (E. Bernard et Cie., Paris.) 12 francs. With numerous figures.

Statique du Navire. By J. Pollard and A. Dudebout. (Gautier-Villars, Paris.) This is Vol. II. of "La Théorie du Navire." Vol. III. ("Dynamique du Navire") and Vol. IV. ("Dynamique du Navire dans le mouvement curviligne horizontal") have also appeared in 1891.

Der Schiffsmaschinendienst. By C. Hartmann. (Eckhardt und Messtorff, Hamburg.) 4 marks. A fourth edition.

Engineering Chemistry. By W. G. C. Hughes, A.M.I.C.E. (Lockwood and Sons, London.) 2*s.* 6*d.* A selection of useful formulæ, rules, and data.

The Mechanical Engineer's Pocket-Book. By D. Kinnear Clark, M.I.C.E. (Lockwood and Sons, London.) 7*s.* 6*d.*, or in leather 9*s.* A most valuable compendium of tables, formulæ, rules and data.

Travaux Maritimes. By F. Laroche. (Baudry et Cie., Paris.) 40 francs. With many figures and an atlas of 46 plates.

Foreign Periodicals, and some Selected Magazines.

United States . Proceedings of the United States Naval Institute. (Quarterly.)
United Service. (Monthly.)
Army and Navy Journal. (Weekly.)
Scientific American. (Weekly.)

Germany. . . Jahrbücher für die deutsche Armee und Marine. (Monthly.)
Marine Rundschau. (Monthly.)
Internationale Revue über die gesammten Armeen und Flotten. (Monthly.)
Militär-Wochenblatt. (Weekly.)
Deutsche Heeres-Zeitung. (Weekly.)
Neue militärische Blätter. (Weekly.)

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France . . .	L'Année Militaire. (Monthly.) Revue Maritime et Coloniale. (Monthly.) Revue Militaire de l'Etranger. (Monthly.) La Marine Française. (Monthly.) Le Yacht. (Weekly.)
Italy	Rivista Marittima. (Monthly.) Rivista di Artiglieria e Genio. (Monthly.) Giornale militare per la Marina.
Austria-Hungary	Mittheilungen aus dem Gebiete des Seewesens. (Monthly.) Mittheilungen über Gegenstände des Artillerie- und Geniewesens. (Monthly.)
Russia . . .	Morskoi Sbornik. (Monthly.)
Sweden & Norway	Tidskrift i Sjöväsenet.
Denmark . . .	Tidsskrift for Sövaesen.
Spain	Revista General de Marina. (Monthly.)
Brazil	Revista Maritima Brazileira. (Monthly.) Boletin do Club Naval. (Monthly.) Revista do Club de Engenharia.
Portugal . . .	Revista Militar.
Argentine . .	Boletin del Centro Naval.

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PART V.

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PART V.

CHAPTER I.

Manning and Training.

The relative space devoted in the *Naval Annual* to the *personnel* and the *matériel* of the fleet is not a measure of their relative importance. If ships, adequate in numbers and of efficient types, are necessary, it is yet more essential to train up crews to man them of the right quality and stamp. All will admit that modern ships and modern appliances for war, if they are to be utilised to the fullest extent, require more nerve, aptitude, and knowledge from those who handle them than have ever been demanded before.

Training of seamen.

By long tradition, the training of our seamen has been brought to such a perfect system that there is little fault to find. The suggestions for change in existing methods which can be advanced from year to year must needs be few. The construction of ships, and their armament, afford more scope for criticism, and occupy a greater number of pages.

Length of service.

The Navy happily is not perplexed by the vexed question of short service, which so grievously afflicts the military authorities. Under present regulations seamen engage for a first period of twelve years. They may engage for a second period of ten years. After serving twenty-two years the seaman is entitled to a pension. He may engage for a third period of five years.

Conditions of life good.

The physical condition and the intelligence of our crews leave little to be desired. If we may draw an inference from a recent publication by an anonymous writer, who describes himself as "a ranker," our men have little cause to complain of the treatment they receive. In the earlier stages of his career the pay of a blue-jacket does not compare unfavourably with that of the merchant-seaman. It is doubtless true that if we wish to secure more of the cream of the intelligent working population of this country for the Navy, the pay must be increased. The Admiralty have for obvious reasons been reluctant to entertain any proposal for a general advance of pay. It

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is preferred to give an encouragement to men to qualify for the many new ratings which, through the ever-increasing complication of armaments and fittings, it is necessary to establish.

Shooting.

Good shooting should be encouraged in the Navy by more liberal rewards. In the crisis of a close engagement, the captain of the turret may be the most important man in the ship. Perfection of drill avails little if the aiming of the gun is inaccurate.

Lengthy commissions great drawback.

It has been repeatedly urged in the *Naval Annual* that the length of commission on foreign stations is the greatest drawback incidental to service in the Navy. It is hard that men should be separated without necessity from their homes for periods of from three to four years. The only argument which can be pleaded is that of economy. To those who know by experience the hardships and privations of life at sea, it is impossible not to feel, when in the environments of Mayfair, that something could easily be spared from the wealth and the luxury, which abound among those who stay at home, to cover the comparatively trifling expenditure which would be incurred if it were a fixed rule that all men who have served two years abroad should be entitled to a spell of duty in a ship in the home ports or the Channel fleet. A few years ago the compiler met a powerful German squadron at Sydney. Every man with that squadron who had been two years at sea was put on board a German mail-steamer homeward bound. The extended term of service on foreign stations causes many men to leave the Navy at the end of their first engagement. The cost of training boys to take the place of seamen who retire is greatly in excess of the expenditure which would be incurred in relieving the crews of ships on foreign stations at shorter intervals.

Crews should be kept together.

Sir Geoffrey Hornby has recommended that the seamen of the Navy, like soldiers in a regiment, should, as far as possible, be kept together and serve under the same officers alternately abroad and at home. Lord Nelson was a strong advocate of such a system. "The disgust," he said, "of seamen with the Navy is all owing to that infernal plan of turning them over from ship to ship, so that men cannot be attached to their officers, or their officers to them."

Engineers.

The engine-room complements of our ships-of-war require revision. The engineers have been too well educated to do contentedly all the work which is done by the engineers of the mercantile marine; while the engine-room artificers, on whom the practical duties devolve, are not equal to the engineers, of whom twelve or more would be found in the engine-room of such a vessel as the Teutonic. It is desirable to introduce into the Navy more men of the class rated as engineers in the mercantile marine.

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The present engineers of the Navy are required for general supervision. If we could give them such experience as could be gained in the course of a year in the engine-room of the Teutonic, it would be of immense advantage. This suggestion has been urged in former numbers of the *Naval Annual.*

Training and education.

Turning to the subject of training and education, a return was presented to the House of Commons, on the motion of Sir John Colomb, showing the entire course of instruction given to cadets on board the Britannia and in the sea-going vessels to which they are appointed. The courses of study for the Royal Navy and for the Royal Marine Artillery, at Greenwich and Portsmouth, are also given.

Entrance examination to Britannia.

We find that cadets entering the Navy at the age of from 13 to 14½ years are engaged on the following subjects: Arithmetic, algebra, Euclid, trigonometry, plane and spherical, navigation, nautical astronomy, use of nautical instruments, construction and use of charts, mechanics, hydrostatics, pneumatics, magnetism, heat, light, electricity, astronomy, mechanism and steam, including both the construction and working of engines, history, French, drawing, and seamanship. To master all the subjects enumerated is impracticable for boys of the age at present fixed for admission to the Britannia. The age of entry should be advanced to 16. Assuming that two years are spent in the training-ship or the college, which should at no distant date be substituted for the Britannia, the cadet would first go to sea at 18. It can scarcely be contended that he would then be too old to learn the seamanship required in the Navy of the present day.

Course of instruction at Greenwich.

Passing to the education of the naval officer, in the next stage, at the college at Greenwich, the course of instruction is remarkable for the importance given to mathematical subjects and the neglect of modern languages. The latter subject is all-important. An officer in command of one of Her Majesty's ships may at any moment be required to act as a diplomatic agent for his country. In a letter to the Earl of Cork, on the instruction which should be given to a youth intended for the Navy, Lord Nelson wrote as follows: "In the first place, it is necessary that he should be made complete in his navigation. French is absolutely necessary."

The curriculum of study, as now carried on at Greenwich, goes very far indeed beyond what Lord Nelson would have imposed on his young friend on the subject of navigation. In respect to modern languages, it falls lamentably short. This will be evident from a glance at the list of subjects of examination at the Royal Naval College, as detailed in the Parliamentary return. The examination

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is divided into two parts, "preliminary and further," comprising the following subjects:—

Preliminary—Algebra, geometry, trigonometry, elementary kinematics and kinetics.

Further—Elementary statics and hydrostatics, physics, steam-engine, French, winds and currents, practical navigation, nautical astronomy, nautical surveying, instruments, observations, and miscellaneous questions.

The total number of marks obtainable is 1800, and of this total 200 are assigned to modern languages.

Ducunt volentem fata, nolentem trahunt.

Practical navigation simple.

A strange combination of circumstances has carried the present writer, in the capacity of a navigator, into every sea and up almost every important river of the globe. He reckons some 250,000 miles of navigation in yachts. These very lines are now being penned in lat. 42° N., long. 30° W. A writer hourly engaged in taking an observation or making up his reckoning may claim to give the opinion of an expert when asserting that all the essentials of practical navigation have been rendered, by the labours of men of science, simplicities for the seaman. Accuracy is needed in the most simple computation; but the chief result which is sought—that of taking the vessel safely to her port—can be attained by men who have no education beyond the "three R's." To navigate merely by rule-of-thumb is not, of course, satisfactory. On the other hand, it is not possible for an officer to be in the fullest sense efficient for a naval command unless he is a linguist. If a choice must be made between mathematics and languages, it is on languages that it would in most cases be best to insist.

Captain Mahan on Naval education.

The whole subject of naval education in the present day gives occasion for serious reflection. In the accumulation of requirements on the side of theoretical and mathematical knowledge, with the extension and development given to schools, colleges, and training establishments, there is some risk that the training of the officers of an essentially practical profession may suffer on the practical side. Captain A. T. Mahan made some admirable remarks on naval education in an address delivered at the United States Naval War College in 1888. "There have," he said, "long been two conflicting opinions as to the best way to fit naval officers, and indeed all men called to active pursuits, for the discharge of their duties. The one, of the so-called practical man, would find in early beginning and constant remaining afloat *all* that is requisite; the other will find the best result in study, in elaborate mental preparation. I have no hesitation in avowing that personally I think that the United States Navy is erring on the latter side; but be that as it may, there seems

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little doubt that the mental activity which exists so widely is not directed towards the management of ships in battle, to the planning of naval campaigns, to the study of strategic and tactical problems, nor even to the secondary matters connected with the maintenance of warlike operations at sea. Now we have had the results of the two opinions as to the training of naval officers pretty well tested by the experience of two great maritime nations, France and England, each of which, not so much by formulated purpose as by national bias, committed itself unduly to the one or the other. The results were manifested in our Revolution, which gave rise to the only well-contested, wide-spread maritime war between nearly equal forces that modern history records. There remains in my own mind no doubt, after reading the naval history on both sides, that the English brought to this struggle much superior seamanship, learned by the constant practice of shipboard; while the French officers, most of whom have been debarred from similar experience by the decadence of their navy in the middle of the century, had devoted themselves to the careful study of their profession. In short, what are commonly called the practical and the theoretical man were pitted against each other, and the result showed how mischievous is any plan which neglects either theory or practice, or which ignores the fact that correct theoretical ideas are essential to successful practical work. The practical seamanship and experience of the English were continually foiled by the want of correct tactical conceptions on the part of their own chiefs, and the superior science, acquired mainly by study, of the French. It is true that the latter were guided by a false policy on the part of their government and a false professional tradition; the navy, by its mobility, is pre-eminently fitted for offensive war, and the French deliberately and constantly subordinated it to defensive action. But, though the system was faulty, they had a system; they had ideas; they had plans familiar to their officers, while the English usually had none—and a poor system is better than none at all."

By a wise decision, recently taken, the Admiralty have reduced the course at Greenwich and Portsmouth for the general body of officers, allowing those only who attain a certain standard to go through the six months' study. Others will have only three months.

Service at sea unduly shortened.

Partly owing to the substitution of mastless for masted ships, and partly owing to the considerable periods spent on shore in the gunnery and training schools, and the College at Greenwich, the actual service at sea in the early stages of a young officer's career has been unduly shortened. On the other hand, the standard of

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attainments in mathematics is being raised; our younger officers are becoming more scientific in gunnery and better acquainted with physics, chemistry, and electricity, while their opportunities of gaining experience in an essential branch of the profession, in which proficiency depends upon practice, are being lost. While the advantage to the Service of having a certain number of officers of the highest scientific attainments cannot be overrated, we must take care lest, in providing the means of higher education for the few, we turn the attention of the Navy unduly to theoretical as distinguished from practical studies.

Instruction for lieutenants of Royal Marine Artillery.

Sir John Colomb's return gives in detail the course of instruction for probationary second lieutenants of the Royal Marine Artillery.

The curriculum includes high mathematics, statics, hydrostatics, kinematics, physics, chemistry, French, German, freehand drawing, fortification, military topography and history, tactics. On leaving the College at Greenwich the lieutenants R.M.A. go through courses of instruction in the Excellent, the Vernon, and at Eastney.

It is to be regretted that officers who have received the high training given to the Royal Marine Artillery should not be employed in more responsible positions in the Naval Service. In the naval lieutenants' list there is a chronic deficiency. It may be partly met by extending the training of the artillery officers in nautical subjects, and drawing the corps nearer to the Navy.

Proposals for reorganisation.

It has been proposed that the Royal Marine Artillery should be reorganised, that officers should enter through the Royal Navy as cadets, and that after they have served a year at sea as lieutenants, they should join the corps as captains. It is contended that the Royal Marine Artillery would furnish specially capable officers for technical work, in connection with steam, torpedoes, and electrical appliances. They would be most capable instructors for the marine forces of Australasia. It was probably with the view of extending the sphere of action of his old corps that Sir John Colomb moved for the interesting return which has lately been presented to Parliament.

Navigation.

In the department of navigation it is gratifying to observe the success and ability which are shown in Her Majesty's Navy. As an eye-witness of what took place, the compiler cannot withhold a tribute of praise to all concerned in the conduct of the fleet under the command of Sir Geoffrey Hornby during the instructional cruise of 1885. Such feats as the departure of the fleet from their anchorage in Blacksod Bay in a dark and boisterous night, and the passage through the narrow and tortuous Sound of Islay and the western shores of Cantyre, also at night, deserve to be remembered. Similar

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performances have been often repeated even in the peace annals of the British Navy. The younger officers of the Navy may justly take credit for the able manner in which the torpedo-boats commissioned for the manœuvres have been handled and navigated.

Losses from unskilful navigation.

While the losses from unskilful navigation in recent years have been very few, cases such as those of the Phœnix and the Wasp should not have occurred. They certainly suggest want of practice on the part of the officers responsible. On both occasions a light was visible, by which the vessel might with ordinary care have been steered clear of danger.

Further instruction in pilotage necessary.

It ought never to be possible for one of Her Majesty's ships to be placed in charge of a commander and navigating officer who have not sufficient experience to be able to navigate in a competent manner. It is contended, and doubtless with reason, that the best of all systems of training in navigation and pilotage is to place an officer in a responsible position. While the most impressive lessons will be learned in the execution of responsible duties, a preliminary course of instruction is indispensable in order to qualify an officer to take charge. Much useful instruction may be given, when opportunity allows, to the cadets and midshipmen in every sea-going ship. There is, however, one stage in the education of the naval officer in which, under existing arrangements, instruction in an art which can only be acquired by practice is lamentably neglected. The course in pilotage, which an officer is compelled to pass through after leaving the Naval College, is not sufficiently practical.

Report of Committee on Naval Education.

The Committee on Naval Education assumed in their Report that the young naval officers on joining the Royal Naval College, at nineteen or twenty, would have attained a fairly sound practical knowledge of navigation. There is reason to apprehend that the cases are numerous in which such an assumption could not be sustained. It is generally admitted that the flying squadron offers all that could be desired for the training of young officers on first going to sea. Unfortunately, only a certain proportion of our midshipmen can serve in this excellent school. A midshipman who has served throughout the early stages of his career in ships not suitable for training purposes will have little opportunity under existing arrangements of making good his deficiency at a later stage. He spends six months in the Naval College at Greenwich; his College course is followed by a month on the Vernon, and three months in a gunnery ship. It concludes with a two months' course of instruction in pilotage.

Compiler's suggestions.

The instruction in pilotage should not be merely theoretical, but

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should embrace a thorough practical training at sea. For this purpose suitable vessels, such as cutters, withdrawn from the Coastguard service, and gun-vessels, should be attached to the flag-ship at Portsmouth, and kept constantly at sea, especially at night, in waters crowded with shipping and difficult of navigation. The Downs and the channels extending from the North Foreland to the Nore, and the North Channel from the Thames to Yarmouth Roads, should be frequently visited. The instructional cruises should extend in the summer months to the west coast of Ireland and the Baltic, in the winter to the Mediterranean. At Malta a yacht, or other suitable vessel of moderate size, should be provided, and should be constantly at sea during the winter, visiting the ports of Sicily and the Ionian Islands. Harbours should be frequently entered at night.

Abolition of navigating line.

The abolition of the navigating line is not yet accepted with universal favour by naval officers. The objections to the change were recently urged anew in a paper read by Captain Fitzgerald at the Royal United Service Institution. It is recognised that the duties of the captain of a man-of-war are too multifarious to allow of his giving that close and constant attention to navigation which the commander of a merchant vessel is able to devote.

Views of Captain Fitzgerald.

A special class of officers is required to navigate. The only question is, whether they shall be a separate class or be selected, as at present, from the executive line. Captain Fitzgerald uses the following argument in support of his view that the special class should be renewed. "The different phases of the art of navigating are so infinite in their variety, the face of Nature is so changeable, winds, currents, tides, atmospheric effects, the art of recognising land under difficult conditions of weather, the power of making a just estimate of the difference between what ought to be and what is in the practical navigation of a ship, are all subjects the perfect mastery of which is so essential to good navigation, that I do not believe that mastery is to be obtained otherwise than by long and constant experience in all quarters of the globe, and if possible in different classes of ships." Captain Fitzgerald proposes to offer pecuniary inducements to officers to remain in the navigating line and to give up their chance of promotion.

More encouragement should be given to the navigating line.

Having supported Lord Sudeley in the House of Commons in his efforts to put an end to the system which formerly prevailed, I remain impressed with the belief that the re-establishment of a separate line is unnecessary. To secure the full advantage of the reform which has been introduced, it is desirable that more encouragement

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should be given to the navigating line. Captain N. Wilson, in a paper recently read at the Royal United Service Institution, in reply to Captain Fitzgerald, suggests that at least one lieutenant of eleven or twelve years' seniority, who has served as navigator from the time he left college, should be selected for promotion to the rank of commander in each year. The Report of the Committee on Education may be quoted in support of this recommendation. "Before proceeding," they say, "to indicate the lines on which a special course might be arranged, we would direct attention to the widespread feeling of disappointment which prevails among navigating officers. Of all avenues to promotion the performance of navigating duties has come to be regarded as the longest and most tedious. While the lieutenant who takes up the gunnery, torpedo, or first-lieutenant line is tolerably sure of advancement, the lieutenant for navigating duties, whatever his ability, and however expert he may be, has the mortification of finding his juniors constantly promoted over his head. Accordingly, the navigating branch, though possessing some advantages, is avoided by the more enterprising members of the profession. It is obvious that this state of things, if prolonged, will lead to serious mischief. The tendency will be to drive every officer of ability from navigating duties; and yet every one recognises how important it is that those duties should be well performed."

Training of seamen.

In connection with the training of our seamen, allusion may be appropriately made to the rumour that the flying squadron is to be broken up. It would seem a grave error to deprive the young officers and seamen of the Navy of that which is now almost their only opportunity of gaining experience in the art of keeping the sea. The difference in point of efficiency between men accustomed to keep the sea and those not so trained was conspicuous in the great war, when the British fleets were always at sea, while the enemy rarely ventured out of port. Nelson's letters and despatches are full of instruction on this important point. Addressing Lord St. Vincent, he writes:—

Nelson's views.

"You have taught us to keep the seamen healthy without a refit. We know not the meaning of the word. The Audacious, Alexander, and others have never seen an arsenal since they have been under my command. . . . Our friend Troubridge is as full of resources as his Culloden is full of accidents; but I am now satisfied, that if his ship's bottom were entirely out, he would find means to make her swim."

Again, on meeting the Spanish Admiral, off Alicante, he writes:—

"The Spanish Admiral sent down to Lord Hood . . . acquainting

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him that as his fleet was sickly, 1900 men, he was going to Cartagena. The captain of the frigate said, 'It was no wonder they were sickly, for they had been sixty days at sea.' His speech to us appeared ridiculous; for from the circumstance of having been longer than that time at sea, do we attribute our getting healthy. It has stamped with me the extent of their nautical abilities: long may they remain in their present state."

Flying squadron affords best training for seamen.

Under peace conditions, iron-clad battleships and mastless cruisers can only be sent occasionally to sea, and the time from port to port rarely extends beyond a few days. Such vessels can scarcely be treated as school-ships for inexperienced men. Sea-habits, sea-instincts, sea-eyes, and the knowledge of navigation and pilotage necessary to convert a landsman into a seaman, can be acquired far better and at less cost in the class of vessels which should be found in a flying squadron.

Cruising under steam uninstructive.

Cruising under steam is dreary work, and uninstructive. To take charge of a watch in a ship under sail is a genuine pleasure to the seaman. Every faculty is engaged. Under steam, in making a passage across the ocean, the engine revolves with the precision of a watch. A look at the compass now and then, a sweep of the horizon, with nothing probably in view, and there is no more to be done. The aversion of the past generation of seamen to steam can be easily appreciated. Perhaps the men of the coming or the present generation may be too ready to look with contempt on the cheap but effective power of the winds.

The experience gained of stormy weather in the Atlantic is a valuable feature in the training of men in the flying squadron. The Mediterranean, where our largest force is stationed, is a great inland lake, in which, except during the short winter, fine weather prevails.

Captain Johnstone on naval training.

Captain Johnstone is a well-known advocate of training young men in vessels capable of cruising under sail. He recognises that in European waters fleets will be propelled in time of war by steam, and will not require to be manned by a large proportion of seamen. He proposes a reapportionment of numbers as between the blue-jackets and marines. At present, the marines are one-sixth or one-seventh of the complements. Captain Johnstone considers that this proportion should be largely increased. A hundred years ago the general composition of the crews was one-third landsmen, one-third marines, and one-third seamen. These proportions might be adopted now. The changes proposed would involve some extension of the instruction now given to marines, more especially in gunnery. For

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the blue-jacket complement Captain Johnstone recommends that a higher standard of school instruction should be required from boys on entering, and that less time should be given to school on board the training-ships. On leaving the training-ships, the boys should be sent at once to sea-going masted ships for five years.

Admiral Luce on naval training.

In a second paper, read at the Royal United Service Institution, the value of sailing-ships as a school of training for seamen was again strongly urged by Captain Johnstone. He quotes the following graphic passage from a paper on naval training read by Admiral Luce at the United States Naval Institute:—

"A youngster's first tussle with a royal in a fresh breeze will long live in the memory of the man. He has no time to feel dizzy or sea-sick, nor does it matter whether he hangs on by his teeth or toes. He must, unaided, roll up that royal and pass the sea-gasket, and do it, too, in a reasonable time, or somebody would know the reason why. From that he goes to wrestle with an obdurate topgallant sail in a stiffish blow, to stowing a jib blowing hard, to taking in a close reef. The wonder often is that he can do any work at all aloft under such circumstances; that he has any mind or strength beyond that which is absolutely necessary to self-preservation.

"No one can deny that what may be called the school of the top-man on board a man-of-war is, or, at least, at one time was, one of the most difficult and perilous that could be undertaken by men in time of peace. Seafaring people, whose duties rarely, if ever, carry them above the vessel's rail, are often appalled by the dangers of the sea. What then shall be said of those whose habitual duty is high up?...

"It is impossible for any young man to go through the school of the topman and become an able seaman, referring always to the sailing-ship, without having his moral being permanently affected by it. Indeed, it is well known that such experience does affect character, and has endowed the sailor with those high qualities of self-reliance, endurance, courage, and patience under difficulties, which have always characterised him."

Less physical exertion now demanded from seamen.

Captain Johnstone points out the great change which is taking place in the Navy in the lessened demand for physical exertion. The exercise of going aloft has ceased. Hauling on ropes is reduced to a minimum. The too extensive use of steamboats has lessened much the pulling in boats, and heavy labour at the oar is now rarely called for. The substitutes for the old form of exercise are boat-sailing and gymnastics. The latter cannot be compared as a training with the working of a sailing-ship. It affords little exercise for the mind. If extensively used, the labour, having no useful effect, would

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become distasteful. Numerous instances can be quoted from the history of joint military and naval operations, in which the seamen have shown superiority over the soldiers in their power of surmounting obstacles, and of doing work requiring unusual bodily exertion, and this Captain Johnstone rightly traces to their exercise aloft.

There is, it would appear, considerable discomfort in the training squadron from overcrowding. This source of inconvenience could easily be removed by putting additional ships into commission for this useful service.

Opportunities for practical training of officers in foreign navies.

We have been behind other nations in the completeness of the opportunities afforded to young officers for practical training at sea in the first stage of their professional career. In the American Navy, six years are spent by young officers at the Naval Academy. The cadets cruise for three months every year in sea-going vessels. In the Austrian Navy officers spend four years at the Academy. They are at sea two or three months every year. In the Danish Navy the school course extends over four years, eight months of every year being spent on shore, three months in a corvette, and a month in a gunboat. In the Dutch Navy four years are spent at school. The midshipmen cruise in summer in a corvette. In the French Navy two years are spent on board the Borda, to which vessel two sea-going corvettes are attached for practice in cruising during two or three months in the summer. On leaving the Borda a year is spent in the sea-going training-ship Iphigénie. In the German Navy the course of instruction extends over a period of five years. The pupils in the Naval School at Kiel cruise at sea during the summer months in the Baltic and in the English Channel. On leaving school they spend two years in a training-ship at sea. In the Russian Navy the school course is six years. Every summer the whole training establishment is removed for four months to a training squadron, consisting of three or four corvettes. In the Swedish Navy the course is for six years, eight months of every year being spent on shore and four at sea.

Captain Kiddle on 'Education of Naval Executive Officers.'

The impossibility of making a good navigator and pilot by merely theoretical instruction is well stated by Captain Kiddle in a paper on the 'Education of Naval Executive Officers':—"The education of a naval officer," he says, "may be roughly divided into two parts: seamanship and, to use a common but expressive phrase, learning. In an article which I published on the former it was thus epitomized: 'Good seamanship means something more than handling a beautiful ship in fine weather; it means that those who are proficient in its

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mysteries never allow the slightest signs to pass unheeded; it means that whether an officer is watching the reefing of a topsail in a gale or setting a royal in the trade winds, or running his ship on a dead lee shore in thick weather, or rounding-to to pick up a shipmate who has fallen from aloft, a knowledge of its principles enables him to do exactly the right thing at the right time. It means that each cloud, as it rises above the horizon, should be carefully watched and its probable effects as carefully weighed; it means that the slightest discoloration of the water, the presence of a patch of seaweed, or the appearance of a land bird, should at once command attention, to know why they are there, and what they may possibly indicate, and with this a vigilance which is untiring and sleepless.' . . . You can no more produce a Nelson by sending a boy to the Britannia than a Vandyke by articling him to an artist; the feeling is innate. It was seamanship that enabled Nelson at the Nile to discern with unfailing correctness that where there was room for an enemy's ship to swing there was room for one of his to anchor; it was seamanship that enabled him at Trafalgar to perceive that by breaking and doubling on the French and Spanish lines he could attack them in detail; and it was seamanship that enabled Hawke, on the iron-bound coast of Brittany, to say to the master who called his attention to the dangers of a lee shore, 'You have done your duty, leave the rest to me.' At present this branch of the profession is apparently subordinated to the torpedo and long-ranged gun. The modern navigating-lieutenant is drifting into the position of the officer he displaced; and if reports are true the majority wish to avoid the duty."

Views in France.

An opinion prevails among the French officers of the new school, and probably it has many adherents in the British Navy, that it is not necessary to have been much at sea in order to be qualified to take charge, first of a torpedo-boat, next of a cruiser, and finally of an ironclad. M. Weyl, in making this statement, expresses himself as an adherent of the views of his venerated chief, Admiral Jurien de la Gravière, who held, and held strongly, that before embarking in a fleet, to take charge of a watch, or going through courses of training in gunnery, torpedoes, or any other speciality, every officer should have had that experience of the sea which can only be gained by making long voyages to distant parts of the world. An officer whose career may have been passed in ships which are at sea only a few days in the year may be zealous in the discharge of his duty, he may be well acquainted with the construction and internal fittings of his ship, but he must necessarily be an unskilful navigator and seaman.

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M. Weyl.

An effective passage on the same subject may be quoted from our valued friend and collaborateur in the present *Annual*, M. Weyl:—"L'homme de mer ne mérite le nom que s'il est avant tout un navigateur expérimenté. C'est pourquoi les stations lointaines, les corvées coloniales, ne sont pas aussi inutiles que quelques-uns le pensent. C'est pourquoi aussi il faut que la marine française défende avec énergie les services qui lui permettent de faire naviguer ses officiers et ses hommes d'élite. Le jour où notre état-major n'aura plus qu'à monter garde dans les rades françaises, et ne s'adonnera qu'à la navigation des escadres dans les eaux d'Europe, il perdra une partie des brillantes qualités qui le distinguent. On ne devient marin qu'à la mer, il ne faut pas oublier. Le véritable navigateur sait accepter les lourdes responsabilités. L'habitude de la lutte contre les éléments développe en lui un instinct particulier, qui lui fait prendre les décisions les plus graves presque sans réflexion."

Having quoted the French practice and opinion, reference may be made to a letter recently received by the compiler from an officer in command of a British corvette on a foreign station.

Value of masted ships for training seamen.

"Some American naval captains," he writes, "whom I have met out here are of opinion that it is the greatest mistake to do away with masted sea-going training-ships. It is the one way to develop that dash and self-reliance blue-jackets have always been noted for, and their gun-drill is learnt none the worse for it, and is a subject that can be fairly mastered in six months. My experience in this ship when we commissioned was that the men from the mastless ironclads were heavy, slow, and stupid compared to others; but after a few months in commission they became quite different men, and the way they now do their gun-drill, on board or on shore, and field exercise, is as different as chalk from cheese. To quote my American friends again, they said, 'Who in our war did we find the smartest men for any dashing bit of work ashore or afloat? Why, the top-gallant yardmen!'

"Personally, I think doing away with the training squadron will be a fatal error, and so, I fancy, do the majority of naval officers.

"If the training squadron is being done away with on account of lack of men, let this station be the training station. Have the efficient masted cruisers, such as Active, Volage, Rover, Calypso, Calliope, Canada, &c., stationed out here (not all, of course), and send, say, one hundred young ordinary seamen to each, once a year, not oftener, by troopship, a corresponding number going home. The ships would always be quite efficient, men take an interest in them, and the work would be much less harassing to the officers than in a regular

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training squadron. Two or three masted cruisers could similarly be utilised in the Mediterranean."

M. Barbey, in reply to the speeches of Admiral Vallon and those who had urged the fitting out of a flying squadron and the reduction of the ships on foreign stations, expressed himself as follows:— "Admiral Vallon, who is also an advocate of flying squadrons, acknowledges that, with the vessels which we possess at this moment the proposed squadrons could not fulfil the duties which would be expected of them. We must first construct cruisers having a speed of at least eighteen or nineteen knots, like our sea-going cruisers and scouts, and therefore very costly. These ships will be ready for service, not in twelve but in eighteen months, with the flying squadrons. I am so much in favour of this scheme that, from next year, I have determined to suppress the permanent North Atlantic Squadron and to replace it by a flying squadron, to be used experimentally within the limits of the Atlantic." M. Barbey.

I close the present section with an earnest appeal to the Admiralty to continue to fit out a detached squadron, covering the expenditure incurred by some reduction of force on certain foreign stations.

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CHAPTER II.

SHIPBUILDING POLICY.

THE construction in progress elsewhere having been reviewed in the first sections of the *Annual*, it may be useful in conclusion to consider what type or types seem best adapted to the requirements of the British Navy.

I.

BATTLESHIPS.

In opening a difficult chapter, it is perhaps unnecessary to say that while, in considering the shipbuilding of the future, suggestions are offered which would involve some change in the policy hitherto pursued, it is not intended to criticise, disparage, or in any way undervalue the noble specimens of naval architecture now being produced for the service of the British Navy. The warships we are building are admitted on all hands to be of great strength and power for battle. In past times our naval architecture was inferior. We were at our best when we made a servile copy of a prize taken from the enemy. The ability of our present designers, in the impartial judgment of a foreign administration, was attested by the prize awarded by the United States Navy Department to Mr. John for his battleship, and the adoption of Mr. White's designs for the Charleston, Philadelphia, and Baltimore. While recognising that we have been doing well, it is not less a duty to consider the possibility of doing better.

British naval architecture.

The essential elements of fighting efficiency are unsinkability, quickness in turning, ability to keep the seas in all weathers, capacity for stowage, armament. Professional opinion is far from unanimous on the question of speed. Whatever be the value of very high speed in facilitating the rapid movements of fleets to a threatened port or in pursuit of an enemy, it can hardly be of supreme importance in fighting a naval action. In ships of the proportions of length to breadth which it is necessary to give in

Elements of fighting efficiency.

Speed.

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order to carry an enormous top-weight of armour and armament, extreme speed can only be obtained by engines of extraordinary power and cost. The French were long content with speeds not exceeding fourteen knots for battleships. This was the speed of the Amiral-Duperré, Redoutable, Terrible, and Indomptable. Following in our wake the French advanced to the fifteen knots attained by the Amiral-Baudin, Dévastation, Courbet, Caïman, and Requin. Five vessels will have a speed of over sixteen knots, viz.: the Formidable, Hoche, Marceau, Neptune, and Magenta, while four others will be capable of steaming from seventeen to eighteen knots, viz.: the Brennus, Charles Martel, Lazare-Carnot, and Jauréguiberry. The speed of seventeen knots which our own Admiralty propose for their first-class battleships cannot be considered inadequate.

Armament.

In relation to armament, the current of opinion is setting strongly against the exaggerated weapons which for a brief period, under the influence of international rivalry, were in favour. The heavy guns have certain admitted advantages. Mr. Jaques argues that "the smashing and shattering effects of guns of the heaviest calibres are requisite against thick armour. The tendency to substitute for an armament of few heavy guns an increased number of guns of reduced calibre will meet with a reaction, because of the loss of that powerful element of destruction, the shattering effect. A mixed battery of large and small guns is the most useful compromise; and what is a ship to-day but a compromise—in fact, a combination of compromises?" The course of opinion in France was clearly shown in the recent discussion on the Navy Estimates. Admiral Vallon urged that the calibres of the future should not exceed 27 cm.

Objections to heavy guns.

M. Lanessan.

In view of the development of the quick-firing guns, which will pour forth a continuous hail of fire, the long interval between each discharge must constitute a grave objection to the heavy guns. The following statistics are from the work of M. Lanessan, who has held the position of reporter to the Committee on the French Navy Estimates:—"The 75-ton gun can be fired once in ten or twelve minutes; the 53-ton gun once in ten minutes; the 27-ton gun once in seven minutes; the 4-ton gun once in two minutes. The 100-ton gun of the Italians can be fired once in ten or twelve minutes. Two vessels steaming at fifteen knots will approach each other at the rate of more than a mile in two minutes. If they fire at a distance of four miles they will pass one another in eight minutes, that is to say, before they are ready to fire a second shot from their heavy guns."

The advising Board of the United States Navy recommend that

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the largest gun should not exceed 60 tons, and that the greatest number of heavy guns should be of 50 tons calibre.

Captain Eardley-Wilmot.

The case against the very heavy guns is summed up by Captain Eardley-Wilmot. The three main objections are:—

I. The portion of a ship protected with extremely thick armour is so limited that hitting in a sea-fight must be a matter of chance.

II. It would be more profitable to attack the large unarmoured area. For such work moderate-sized guns are sufficient, and are superior to those throwing enormous bolts.

III. There must be considerable risk of one-half of a powerful armament being disabled by an accident or by a single lucky shot from an enemy.

Broad Arrow.

The *Broad Arrow* may be quoted in the same sense:—"The gun has long ago beaten the armour, and all that has since been aimed at is to beat armour at unreasonable distances—distances at which the armour cannot be hit at all. The race ought to stop when penetration is effected through armour of ordinary strength at 2000 yards. This armour of ordinary strength cannot be more than 10 or 12 inches. A modern breech-loading gun of 12 or 14 tons, with greatly reduced powder charge to what such a gun at present admits, is probably up to the requirement. A ship with a uniform and numerous artillery of this power, armoured over a large area with corresponding plating, might possibly prove, power for power, much more economical than the immense structures carrying a very mixed armament with a very small plated area which are now in vogue."

Compiler's views.

Our 27, 22, and 14-ton guns of recent pattern, with high initial velocity and great powers of penetration, seem well adapted to all practical requirements. They can, when necessary, be worked by hand. This is no small advantage.

If guns of less weight can be accepted, some reduction of displacement, which on general grounds is so desirable, can be accepted with less hesitation. With every increase in the weight of the guns, the weight of the turret in which they are mounted is proportionately augmented. The increased weight of the turret involves a corresponding increase in the displacement of the ship. It was largely through the substitution of four 29-ton guns for four 67-ton guns in the Centurion and Barfleur that the displacement has been brought down to 10,600 tons from the 14,150 tons of the Royal Sovereign class.

Armour.

Naval opinion is unanimous that ships designed for the line-of-battle should be armoured. The value of armour was shown in the action between the Alabama and the Kearsage, although the latter

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was only protected by cables temporarily fitted in the way of the boilers and machinery. Sir Geoffrey Hornby considers that an armoured vessel is equal to any three unarmoured vessels. If assailed she will make a run at one vessel or the other, attack her with her guns, threaten her with her ram, and it must be death to that vessel if she touches her. The ironclad will always be firing at the two other vessels one gun at the least, and with shells, the bursting power of which we know will destroy the fighting power of the cruiser with a single shot.

Distribution of armour.

The controversy in relation to armour has long since been narrowed down to the question of where and how it shall be used to the best advantage for the protection of the ship. Let us hear some experts on this matter.

Commander Hoff.

Commander Bainbridge Hoff, U.S.N., holds that the primary aim in battle should be to fire into the least protected parts of the ship, where the men are congregated. To kill the crew and officers is more important than to disable the machinery. The destruction of the unarmoured parts may be fatal, even though the citadel remain uninjured. If this were the experience of actual warfare, the sacrifices imposed in order to give protection to citadels might be borne with impatience. In the Chilian War the Huascar, after a determined resistance, was captured, not because the ship was sinking or disabled, but through the slaughter of the crew.

French opinion.

These considerations would seem to point to the conclusion that armour is more needed in front of the guns or to protect machinery than at the water-line. A reaction is taking place in the opinion of French authorities on this subject. They had resolutely retained the belt, leaving the high upper works of their vessels without protection. The invention of melinite shells led to a change of view. The late Admiral Bourgois was of opinion that it would be desirable to accept a reduction in the thickness of armour, in order to extend the area of the protected side, and that every part of the ship where it is necessary that men should be stationed should be protected. The water-line can be protected otherwise than by the use of vertical armour. Coffer-dams filled with cellulose or woodite, and armoured decks, would form effective substitutes.

Compiler's views.

It is difficult to suggest any better application of armour than has been lately adopted in English construction. If any change were contemplated, it is probable that some weight of armour might be taken from the water-line, the protection for the batteries being proportionately increased. It seems necessary that the conning-

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tower should be well protected. The steering of the ship must be put into the hands of the captain. "If," says Commander Bainbridge Hoff, "the captain falls, no one can continue his train of thought to a profitable conclusion." The successful performance of an evolution must depend on following up unhesitatingly the first impulse of the instant.

Dimensions.

The vulnerability of the most powerful ships we can build is a strong argument in favour of types of moderate dimensions. Sir Edward Reed, strong in the confidence which he rightly possesses in his professional ingenuity, maintains that a vessel could be built which might be attacked by any torpedo, gun, or ram in existence, and still keep her flag above water. The powers of resistance of armoured ships in the American Civil War were certainly remarkable on many occasions. We have, on the other hand, striking illustrations of the vulnerability of ships of great size, strength, and power. It is difficult to conceive of any method of construction which will secure a ship from destruction by a well-aimed blow from the ram of an enemy. In the melée of battle it will be impossible so to manœuvre ships as to deny always to the enemy such an opportunity as was afforded to Admiral Tegethoff at Lissa. In close action the heavy gun has a power of penetration which can only be withstood by armour of enormous thickness. Increase of thickness means reduction of the area protected. In the succession of desperate charges which must constitute the naval battle of the future, at the moment when ships are rushing past each other within pistol shot, the unarmoured sides will be riddled by shells which will explode with the force of a volcano.

Such are the perils of battle. There is another situation of not less imminent danger. To go forth to meet the enemy and to blockade him in his own ports, to take at once the offensive, has been proclaimed the proper system of defence for the Power which claims to command the sea. The position of a fleet of ironclads off a blockaded fort, full of torpedo boats, on a dark night or in thick weather, must be critical in the extreme. Admiral Hobart, who had practical experience in the Red Sea, and Admiral Aube, were strong on this point.

The destruction of the Blanco Encalada is the most recent illustration of the power of the torpedo. "Never, perhaps," says the *Engineer*, "was so signal a victory more cheaply gained." The torpedo is "a weapon of immense possibilities." The Blanco Encalada was caught unawares, and paid the penalty of want of vigilance and care.

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It is true that the torpedo-nets were not down; but if armoured rams were combined with the flotilla of torpedo-boats, it is certain that resolute charges at speed directed from such vessels at the heavy ironclads would result in sweeping away the projecting booms from the sides, and fouling the screws with the mass of wreckage. The great ships would thus become an easy prey to their puny antagonists. No means of defence would seem effective against the torpedo, other than the triple bottom and the most minute subdivision into compartments.

Experience of past.

In considering what should be the displacement of our modern ships, the experience of the hard naval struggles of the past, though fought in wooden ships and under sail, will not be uninstructive. The primary conditions and principles of naval warfare are the same in the new Navy as in the old. Admiral Colomb, to whom the Navy, naval writers, and the country owe so much, has carefully and laboriously brought together the results of the experiences of the past. Going back to the days of the Armada, he appropriately quotes the following passage from the 'Discourse of the first invention of ships,' by Sir Walter Raleigh:—"There are in England at this time 400 sail of merchantmen fit for the wars, which the Spaniards would call gallions, to which we may add 200 sail of hoys of Newcastle, which each of them will bear six demi-culverins and four sakers. The 200 which may be chosen out of 400 by reason of their ready staying and turning, by reason of their windwardness, and by reason of their drawing of little water, are of extreme advantage near the shore and in all bays and rivers, to turn in and out. These I say, alone, and well-manned and well-conducted, would trouble the greatest power in Europe to encounter them upon the seas, for they stay and turn so readily, as, ordering them into small squadrons, that three of them at once may give their broadside upon any one great ship, or upon any angle or side of an enemy's fleet, they shall be able to continue a perpetual volley of demi-culverins without intermission, and either sink or slaughter the men, or utterly disorder any fleet of cross-sails with which they encounter."

Tendency to moderate dimensions.

Descending to later times, after the experience of the hard fighting in the first Dutch war, the number of middle-class ships was much increased. Admiral Colomb gives a tabular list of the ships in commission in 1793 and in 1813, showing a rapid reduction in the number of ships intermediate between the battleship and the cruiser. There was at the same time a corresponding increase in the number of cruisers, and a constant, if less rapid, increase in battleships of medium tonnage.

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Ships in Commission.	1796.	1813.
90 to 120 guns	22	14
80 guns	5	
74 „	54	85
64 „	24	2
44 to 56 guns	25	4

From the experiences of the past, Admiral Colomb concludes that neither the very great nor the very small in ship construction is desirable. Ships of vast size were not found to be our great requirement. Moderate dimensions had sufficed to keep the sea against all comers; it will probably be the same in the next great naval war.

Mr. Jaques.

To build flimsily for the purposes of war would be a graver error than to build of excessive dimensions. The 10,000 tons of the Barfleur are a golden mean. Mr. Jaques excellently observes that "there is much left to learn by all nations; for our war-ships still lack coal capacity, boiler-power, engine-power, armour protection, and ammunition supply; everything, in fact, but displacement, and that we have too much of, the numerous weights soon aggregating a greater displacement than is sought. Big ships and little ships, heavier guns, larger charges, heavier projectiles, greater velocities, bigger ships, bigger guns, thicker plates, larger torpedo-boats and greater energies, larger torpedoes and heavier rams, all these will remain in the race for some time to come. No nation will depend alone on a myriad of sparrows, no matter how able they may be to inflict a great number of small wounds."

Tactical considerations in relation to dimensions.

In the discussion on a paper read by the compiler before the Institution of Naval Architects in their first session of last year, the policy had been recommended of building battleships of the more moderate dimensions of the Barfleur and Centurion. In a great programme of construction it did not seem advisable to build no ships save those of the large dimensions of our first-class battleships. The suggestion was met by Mr. White with the argument that, in the tactics of a naval engagement, it would be impossible to concentrate a great number of small vessels, and that the line-of-battle must be compressed. It may be observed, in passing, that the vessels recommended, being of 10,600 tons, could scarcely be characterised as small. Not to insist further on this correction, let us, in the light of the experiences of the past and the opinions of

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contemporary authorities, endeavour to form some conception of the probable tactics of future battles.

It must be the object of all naval tactics to bring the whole of your force to bear upon a part of the enemy's force. This was what Nelson did at the Nile and Trafalgar. Concentration of attack will be the more effective when an advantage has been secured in point of numbers, and in the manœuvring qualities of the ships. Much has been written on this subject by French officers. Admiral Jurien de la Gravière gives a graphic picture of two fleets of ironclads facing one another. They close without opening fire. Each ship singles out an adversary, and endeavours to ram. Most probably ships will collide or pass at close quarters without touching. Projectiles will be discharged within pistol shot which cannot miss their aim. The stoutest armour-plates will be pierced, the strongest frames will be shattered. The moment each contending fleet has penetrated through the line of the enemy, the helm will be put over, and the ships will return to the charge. If an action is to be a succession of charges, leading in a few moments to a general melée, the admiral must give up the attempt to control, and combine the movements of his ships.

If the views of these distinguished admirals of the French Navy correctly represent the combats of the future—and Lissa, the only battle of which we have had experience in modern times, was fought in the manner they describe—once an action is begun the time for formal manœuvres is at an end. All the admiral can do is to give an example of personal valour. The words of Napoleon, when he sent forward Marshal Ney to attack the Russians at Friedland, may well be applied to the conduct of a naval action: "Voilà le but: marchez-y sans regarder autour de vous; pénétrez dans cette masse, quoiqu'il puisse vous en coûter, et ne vous inquiétez pas de ce qui pourra se passer à droite, à gauche, ou sur vos derrières."

Recent opinions as to the limitation of dimensions.

Turning to the last debates on the French Estimates, Admiral Vallon, as representing the opinion of the French Navy, spoke as follows:—

Admiral Vallon.

"On admet généralement aujourd'hui, en Angleterre comme en France, que le cuirassé le plus fort ne doit pas dépasser 12,000 tonnes et le croiseur protégé 8000 tonnes. Ce sont là des limites extrêmes, que beaucoup de marins voient avec regret. La construction des bâtiments de plus de 11,000 tonnes coûtera de 27 à 28 millions, c'est-à-dire 2 fr. 50 par kilogramme. C'est un moyen empirique peut-être, mais assez exact de connaître le prix d'un cuirassé. On peut l'estimer comme une denrée ordinaire, et il est bien rare qu'on s'écarte de quelques centaines de mille du prix total réel."

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M. Weyl.

M. Weyl puts the matter very clearly. "En général," he says, "les marins s'inquiètent trop peu de la question d'argent. Ils devraient cependant comprendre que, une somme étant fixée pour les constructions neuves, il importe de ne pas négliger le facteur qui s'appelle le nombre. Au moment où l'on discutait chez nous la question des cuirassés monstres, je n'ai jamais trouvé un amiral, même partisan de ces coques coûteuses, qui n'ait répondu dans le sens que je voulais à cette question: 'Que préférez-vous, une escadre de six cuirassées de 15,000 tx, ou une de huit cuirassés de 12,000 tx?' Tous optaient pour la flotte la plus nombreuse, ce qui ne les empêchait pas de soupirer après les plus gros navires, sous le prétexte qu'Anglais et Italiens en avaient ou en construisaient. Il faudrait cependant être logique."

Captain Eardley-Wilmot.

Captain Eardley-Wilmot, after describing the Royal Sovereign, and tracing the causes which have led to the acceptance of the dimensions necessary to enable such formidable fighting power to be concentrated in a single ship, expresses his own preference for smaller dimensions. "In old days, though four-deckers were to be found in the fleets of our adversaries, we abstained from adding them to our own. We converted three-deckers into two-deckers. If we raise the displacement to 20,000 tons, we might increase protection by armour. We do not do it, because the hull would not resist the ram or the explosion of a charge of gun-cotton. There is no reason why a good supply of coal, high speed, and a powerful armament should not be obtained with a displacement of 10,000 tons. In eight vessels of 14,200 tons we have an aggregate of 113,600 tons of material employed. If we distribute this among twelve vessels, they can be approximately of 9500 tons. Most admirals would prefer to command the twelve ships to the eight."

Captain Eardley-Wilmot rightly insists on the necessity of preserving some balance between the power of the mighty weapon placed in their hands and the faculty, which cannot be higher than average humanity can supply, that has to wield it. In modern warfare, terrible indeed will be the strain placed upon the commander of a ship in action. On him all will depend; on his quickness of eye, on the happy inspiration of the moment. If he fail, in an instant his ship may be lost. An unfortunate movement of the tiller may doom to destruction perhaps one-tenth of the naval force of the country and £800,000 of the public treasure. How different from a battle on land, where a commander may take a deliberate survey of the progress of the struggle!

Admiral Colomb.

Admiral Colomb's argument, based on the consideration of cost, is

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put with lucidity and cogency. "The most powerful single ship which can be produced for a fixed sum of money expended in a given time is not necessarily the most powerful naval force which the money can command. It is only so if the same money will produce nothing capable of matching her except a sister vessel. The question would arise whether the single ship could be where she was wanted at the time she was wanted, or whether two or more ships could not be built which, only costing a like sum, would be as much superior to her when combined as she was to any former single ship."

Compiler's views.

Having dispassionately examined all that has been urged in favour of adhering to a policy of construction in the largest dimensions only, I find myself following the late Admiral Aube to the conclusion that, while each individual ship should be large enough to secure full fighting efficiency, the victory is assured to the fleet which has the greatest numbers, and which would have a reserve ready to go into battle uninjured by the first collision between the opposing forces.

How those influences operate which ceaselessly tend to the growth of dimensions in the construction for the British Navy is admirably traced in two articles, bearing the signature of L. F., which recently appeared in *Le Yacht*. The following paragraphs embody the substance of the articles:—

***Le Yacht.* On the dimensions of British ships. Article by L. F.**

At the moment when the programme of the Defence Bill is in course of execution, it may be opportune to cast a glance at the battleships of the British Navy, and to trace the succession of ideas which have led from the Devastation to ironclads of 14,000 tons. The Devastation was designed for service in the Channel and in the Mediterranean. She was to be able to cross the Atlantic in case of necessity. The original idea was modified, even before the ship was launched. The loss of the Captain, on the night of the 7th September, 1870, gave rise to misgivings as to the low freeboard of the Devastation. A committee was appointed to examine the designs of all the ships in construction. Notwithstanding the favourable opinion of the committee as to the stability of the vessel, the topsides were carried up amidships to the level of the upper deck of the central battery, thus increasing the freeboard by 6½ ft. It was further decided, in the case of the Dreadnought, then on the stocks, to extend the citadel to the full width of the ship. At the trial of the Devastation on the measured mile, when 13·8 knots were attained, experience was first gained of the bow wave. In a calm sea the upper deck was awash. The idea of her fitness for crossing the Atlantic was abandoned. The Devastation was thenceforth classed as an armoured coast-defence ship, and it was decided that

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the Dreadnought should be constructed from end to end with the same freeboard as had been originally proposed for the citadel only. The Dreadnought may be described as an enlarged Devastation, with one knot greater speed, protected by armour 2 in. thicker, the upper edge of the belt, outside the citadel, being 3 ft. above the water-line. The armament consisted of 38-ton instead of 25-ton guns. The Dreadnought being well in hand, and the plans of a new vessel,—the Inflexible, which should combine the latest improvements, discovered too late to be adopted in the Dreadnought,—being under consideration, it was observed in England that in France all the ironclads in hand are sea-keeping ships with high top-sides. . . . It was recognised that a battleship can only be a compromise; that perfection is difficult of attainment; that of the three elements of fighting efficiency, sail power, armament, and protection, which it is possible to develop in varying proportions, it may perhaps be wrong to sacrifice any one for the sake of the other two. The decision was accordingly taken to put in hand two masted ironclads, the Alexandra and Temeraire. The Alexandra was to exceed in size the Colbert by 1000 tons, the thickness of armour being 12 in. on the belt and 8 in. on the citadel, as against 8½ in. and 6¼ in. in the case of the French ship. In other particulars the British ship had no advantage. The Temeraire was somewhat less powerful than the Alexandra, and, like the French ironclads, carried two guns in barbette towers.

It has been a point of honour with the Admiralty always to give to the British Navy the most powerful ship afloat. In the development of this policy they were now compelled to reduce the area protected by armour. In view of the enormous increase in the power of the gun, it had become necessary to increase the thickness of armour from the 14 in. of the Dreadnought to 24 in. for the Inflexible. In the Inflexible two-thirds of the water-line were unprotected by armour. The extremities therefore were subdivided as minutely as possible. The armament was to consist of four 80-ton guns.

It had been intended that the new ship should not exceed the Dreadnought by more than 200 tons. The actual increase in the displacement was 1000 tons. When this result was known it gave rise to much criticism. At length the disputants grew weary of a barren controversy, and a truce was maintained for a period of three years. The Ajax and Agamemnon, reduced copies of the Inflexible, were laid down in 1876. They were followed by the Colossus and the Edinburgh, which were mere repetitions of the Ajax and

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Agamemnon, but with an increase of 800 tons in the displacement.

The hesitation which had prevailed in England as to further developments ceased when it was observed that in France it had been decided to give up the high freeboard, hitherto a characteristic feature of their ironclads, and to arm their ships with guns of very heavy calibre, which were to be mounted in vessels of the Dreadnought type, but of smaller dimensions. The Indomptable, except as to the absence of armour for the protection of the citadel, may be regarded in its broad features as a tolerably faithful copy of the British ship.

Under the impulse derived from the line which was being followed in France, the construction of the Collingwood was decided upon. The displacement of the Indomptable was 7000 tons. It was held necessary for the British Navy to build bigger ships, and a displacement of 10,000 tons was accepted. In France they were building four ships. It was decided to build six for the British Navy; and thus the Admiral class was called into existence. When we look at the legend of one of the ironclads of this class, it is possible to trace between the lines the developments of shipbuilding during the ten preceding years. We see the minor armaments, as anticipated by the Committee of 1871; the higher freeboards, and the turrets, as in the Dreadnought, at greater distances apart. Next we have the barbettes of the Temeraire, copied from the French models. Finally, we have the citadel of the Inflexible, with high bulkhead forward and abaft, but cut down on the broadside to a narrow belt at the water-line, extending over only forty-five per cent. of the length. The ships were powerful; but the errors into which the designers had been led, in cutting down the bows and giving inadequate protection on the water-line, were the subject of severe criticism.

We next come to the Trafalgar type, designed to meet the demand now insisted upon by naval officers for protection to the central battery from the fire of guns of moderate calibre. The Trafalgar is absolutely a Dreadnought, with an independent protected central battery, taking the place of the superstructure of the former type. The belt does not extend from end to end. One-third of the water-line is unprotected.

To meet the Indomptable, of 7000 tons, with a more powerful ship, a first advance had been made to 10,000 tons. The greater protection required in vessels of the Admiral type had led to the adoption of the design of the Trafalgar, with a displacement of 12,000 or more nearly 13,000 tons. The increase of size is great

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when we take into view that the main armament is the same as that of the Admiral class.

A still more striking example of that exaggeration of tonnage to which the desire for perfection inevitably leads is afforded in the case of the Victoria, 10,500 tons, the last specimen of a class of which the prototype, the Hotspur, displaced 4000 tons. The history of this class, of which the Hotspur, Rupert, Conqueror, Hero, Victoria, and Sanspareil, are members, forming as it were a family apart, is interesting. The Hotspur was a ram, intended to accompany fleets of battleships, to which it was thought that she would be a useful addition. The armour belt extended along the whole length of the water-line. The armament consisted of one 12-in. gun, mounted on a revolving plate, placed in a fixed turret, pierced with four large ports. It was seen that a gun so mounted was too much exposed, and it was decided to provide the Rupert with a revolving turret, armed with two 10-in. guns. The modification in the turret, and an increase of 1500 tons in the displacement, were the main points of difference between the Rupert and the preceding vessel.

More speed being required in ironclad ships, a design was prepared of an enlarged Rupert, to steam 15·5 knots, and to be armed with two 12-in. guns in an enclosed turret. The belt at the water-line was cut short by not carrying it to the after end. Notwithstanding the effort to reduce weight, the displacement was increased from 5500 tons to 6300 tons in the case of the Conqueror.

It was now decided to build two new vessels, with improvements, the guns being placed at a greater height above the deck, and a 10-in. gun being mounted on the stern. In the desire to carry the thickest armour and the most powerful guns afloat, this single-turreted ship grew visibly in size, and the Rupert, with a reduced length of belt on the water-line, became an ironclad of 10,500 tons displacement, armed with 100-ton guns.

Scarcely was the building-shed in which the Nile had been constructed free, when a new programme of construction was brought forward. The Admirals and the Victoria had been condemned for the want of height at the bow, and it was decided as a first principle that the new ironclads, of whatever type, should have more freeboard. Not only was a higher bow insisted upon, it was considered indispensable to give protection by armour to the auxiliary armaments. The introduction of small explosive shells has revived the old idea of protecting the crews of moderate-sized guns by armour of some sort. Thus it was that when the new programme of construction came under consideration, the demands for powerful

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armament, extended protection, great speed, and prolonged endurance at sea, could not be satisfied with a less displacement than 14,000 tons.

If we look to the construction in progress elsewhere, we find that in the United States it has been deemed possible to combine a very high degree of fighting efficiency with a displacement of 10,000 tons. The Advisory Board recommended three types:— **Recommendations of American Advisory Board.**

(I.) A first-class battleship: displacement 10,000 tons, speed 17 knots, coal endurance 10,800 miles at 10 knots, a 15-in. belt, 16-in. turrets, armament two pairs 50-ton guns in two turrets; ten 5-in. guns in low 3-in. barbettes;

(II.) A battleship of limited coal endurance: displacement 8000 tons, speed 15·8 knots, belt 17 in., turrets 17 in., two pairs 60-ton guns in turrets, four 5-in. guns in low 3-in. barbettes, coal endurance 2770 miles at 10 knots;

(III.) A third-class battleship: displacement 6000 tons, speed 15·8 knots, coal endurance 2550 miles at 10 knots, belt 15 in., turret 15 in., two pairs 50-ton guns, four 5-in. guns.

The Naval Department, proceeding on lines traced by the Advisory Board, has now in hand three vessels of 10,000 tons. In his last report, the Secretary of the United States Navy refers to the ships of the Indiana type now under construction as "undoubtedly the most powerful element of protection that this country can possess. The main batteries throw at a single discharge a weight of projectiles of three tons, with a total energy of 210,000 foot-tons. A projectile from a 13-in. gun will perforate 22 in. of steel at a distance of a mile. The secondary batteries, comprising sixteen 6-pounders and four 1-pounders, discharge 330 projectiles per minute." The deficiency of coal endurance in these ships is an admitted defect. They carry 500 tons as against 750 tons of the Centurion type.

If we look for guidance to French construction, we see in hand at the present time three ironclads of 12,000 tons and four of 6590 tons. Russia has one ironclad only building, for the Black Sea Fleet, of 10,180 tons. If we look at Germany we see four ironclads, of 10,300 tons, in hand. If we look to Spain, where an extensive programme of shipbuilding has of late been carefully considered by the light of the most recent developments in the navies of other Powers, we find that two ironclads have been laid down, with a displacement of 9235 tons. **Ships in construction for Foreign Navies.**

Large dimensions are essential to produce an efficient ironclad, with the speed, the seaworthiness, and the means of offence and defence, which constitute their fighting power. Yet there is a limit **Compiler's recommendations.**

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beyond which the gain in the individual power of the battleship is more than counterbalanced by the loss in respect of the numbers which can be bought for any given sum of money. It is not possible to draw an arbitrary line. No design that has yet been produced for any navy seems more completely to meet the varied requirements of a British ship of war than that which the Admiralty have approved and adopted for our so-called second-class battleships.

II.

Coast Defenders.

Coast defenders.

To build specially for coast-defence is perhaps not congenial to the feeling of our country. We aim at a maritime supremacy. It is assumed that in case of war we shall best defend ourselves by taking the offensive. Looking, however, to the difficulty of maintaining an effective blockade under modern conditions, it is a question whether it would be politic, and whether the country would approve, that it should be left at any time entirely without the protection of the fleet. Until quite recently it was an axiom that we should always have a force at hand strong enough to command the Channel. If this view were accepted, it might be desirable to build a few vessels of a type which would be effective for coast-defence, though not adapted to a wider range of operations. The requirements which should be fulfilled in a coast-defence ship were well formulated by Admiral Penhoat. "The best coast-defence is a fleet of specially constructed ironclads, capable of going to sea in any weather along a coast. Each harbour should have its flotilla of torpedo-boats. These coast-defence vessels should have great battery power, draw little water, have good speed, and be nearly unsinkable. They need not be strongly manned. They will not require a large stock of provisions, nor a great supply of coal. They will need capacious magazines. They should be accompanied by look-out vessels."

The four ships of the Tréhouart type seem to meet the requirements of a coast-defence service—displacement 8590 tons, two 30 cm. guns, a powerful auxiliary armament, speed 17 knots.

For coast-defence the Americans have held steadfastly to their Monitor type. The Monterey, recently launched, is practically a Monitor, with the addition of a superstructure amidships. Improved Monitors might be extremely effective for defensive service in the English Channel.

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III.

Rams.

A fighting ship specially adapted for ramming has been much advocated in the American Navy, and in France by Admiral Aube. "Nobody," he writes, "can foresee what shall be the nature of the operations undertaken in the naval warfare of the future. None can predict what will be the most effective weapon. Fabulous sums have been expended by France, Italy, and England in building ironclads, and none of these formidable engines of war, whether built of iron or of steel, will be the final type of fighting-ship of the future. The fundamental idea in the design of ships has been that the battleship must be an ironclad, combining the maximum of offensive and defensive power. A serious, but not the most serious, objection to the ships of recent creation is that sufficient attention has not been paid to the principle, now so universally accepted in industrial organisations, of sub-division of labour. Would not a combined group, in which the powers of the gun, the ram, and the torpedo would be developed to the best advantage, be preferable to any single ship in which separate types of every naval weapon had been concentrated? Assume an engagement between a modern battleship and a group of vessels, including a ram, a ship armed with a gun of the heaviest calibre, and four torpedo-boats, all having very high qualities of speed. Would the battleship have the advantage over such a group?" Rams.

It is with some hesitation that the building of special vessels for ramming is recommended. The objections to this type are well put by Captain Grenfell. "What may be termed the chances of inaccuracy in the use of the ram are enormous. Students of Admiral Colomb's writings will know what a hair's-breadth separates in a ramming attack the case of ramming your adversary from that of being yourself rammed. At the worst, a failure in gun or torpedo is but a lost shot: but in ramming, if you fail, you may bring immediate destruction on yourself. It is no doubt this terrible uncertainty which has thrown into the background the proposals to use the ram as the chief mode of attack, which were so numerous some years ago."

On the other hand, the deadly effect of the ram has been shown, both in battle and in the disasters which have occurred in peace service. 'Colburn's Magazine' for September, 1866, contains the following observations:—"If Lissa affords a criterion of what guns can do in an encounter between ironclads, it would be advisable to Lissa.

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build ironclads for the purpose of ramming, and, instead of arming them with guns, put such a thickness of armour on their sides as will render them impenetrable by shot. If destructiveness is the desideratum of warfare, it can hardly be worth while to send a fleet of ironclads to sea, carrying 531 guns, for the purpose of killing eight men and wounding 40."

Admiral Hobart.

Admiral Hobart was of opinion that all fleets should be attended by rams. They should lie by until one of the enemy's ships was in difficulty, and then rush at the injured vessel with the ram. Guns in such vessels would be almost superfluous.

Admiral Ammen's design.

Admiral Ammen, of the United States Navy, has taken a leading part as the advocate for the construction of rams on lines favourable for speed, facility of turning, and the greatest practicable immunity from projectiles with a minimum of metal. A ram is now being built from the designs of Admiral Ammen, at Bath, Maine, armed with quick-firing guns. The vessel has an elliptical keel, which will give great facility in turning. The cross-sections are elliptical, sponsoned out so as to make good lines for the deflection of projectiles, and having sharp edges against which an enemy may deal a blow with the stem, without inflicting injury. The ram is built on longitudinal girders.

It is stated by Mr. Jaques that experiments are being made with the Ericson submarine ship, which, if successful, will supply a detachable ram, practically several hundred feet in length. A fixed ram, though superior to the torpedo and the gun as regards destructive effect, is a long way behind both in range.

Polyphemus type recommended.

A vessel armed with the Whitehead torpedo or the dynamite guns may be fought as a ram, but would be more formidable than a vessel in which the stem was used to give the fatal blow. The weapon of the torpedo-ram extends at least a hundred feet beyond the stem and on either bow. It was believed by the Admiralty, which approved the design for the Polyphemus, that the armoured torpedo-vessel would be a formidable auxiliary to a fleet. It is much to be regretted that that idea has not been followed up. The Polyphemus of the future should be less complicated, less costly, carry a smaller armament, and be much more heavily armoured than our pioneer vessel of this type. No method of attack upon a fleet of heavy armoured ships can be conceived more formidable than that which would be made by a numerous flotilla of swift and well-armoured rams. Their armour should be sufficient to protect them from quick-firing guns. It would be difficult to hit them with the heavy guns.

Rams should find a place in the shipbuilding programme for the

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British Navy. In our large fleet no type should be omitted. We want more ships of the Polyphemus type, but of less complicated and less costly construction.

IV.

Reconstruction and Re-armament.

To hold the Channel, we require a force of vessels adapted to the combined action of fleets. We need a similar force in the Mediterranean. For the protection of the long lines of commerce on distant seas, we require a special class of cruisers, capable of keeping at sea for long periods of time. The fleets necessary for the Channel and the Mediterranean are not adapted for the protection of the great ocean routes, nor are the vessels suited for operations in distant seas the best adapted for the Channel or the Mediterranean.

The First Lord lays down a most sound principle of policy when he says in his statement that "If our Navy is to be in a condition to do effective sea-going work with the great mass of the vessels on the active list, a continuous system of reconstruction and re-boilering is hardly less important than the constant prosecution of new construction. The longer a vessel of any size requiring large repairs is left untouched, the less do the repairs repay their cost."

The early ironclads as armoured cruisers.

It has been urged in previous numbers of the Annual that the older ironclads, though becoming obsolete for the line of battle in European waters, should be taken in hand and modernised. The hulls are well-built and sound. The long ships of the first period of armoured construction, the Warrior and Black Prince, the Achilles, Minotaur, Northumberland, and Agincourt, have been for some years classified in the comparative tables in the category of armoured cruisers. For this service they are admirably adapted. Their insufficient coal endurance and obsolete armament are their main defects. Both are remediable. Fitted with triple-expansion engines and a quick-firing armament, the vessels under consideration, which are obsolete only in their machinery and guns, would be able to do good service in patrolling the great trade routes east of the Suez Canal and the Cape of Good Hope, or in giving protection to convoys from the possible attacks of protected cruisers or less formidable assailants such as the ships converted into cruisers from the merchant service. The length and the large dimensions, which would make our ironclads of the earliest type unsuitable as battleships, even as a reserve, in the second line, behind our best and newest ships, are positive

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advantages when steaming over the long billows of the Southern Ocean.

Audacious class

In addition to the long ships, we have the five vessels of later date of the Audacious class, 6000 tons, armed with a powerful battery, and carrying 8-in. armour at the water-line. They are roomy and comfortable, and were admirably adapted for foreign service, until left behind by the recent wonderful advance in engines and armament.

The Audacious class, Bellerophon, Sultan, and Hercules, have been classed in our comparative tables as second-class battleships, and set against a list of French second-class battleships, which includes seven ships built of wood, the earliest dating from 1868.

Still valuable.

All our second-class battleships are capable of doing good service, even in European waters, as a fleet in reserve for the line of battle. Descriptions of the battles of the future have been given by French writers, almost as graphic as that of Mr. Arnold Forster, the author of 'In a Conning-Tower.' The writers anticipate the virtual annihilation of the fleets engaged. All concur in predicting that that fleet will probably hold the supremacy of the sea which has the strongest force of fresh ships in reserve. Ironclads, which we are now too ready to lay aside as obsolete, would be dangerous foes, even to the newest and most perfect ships when disabled in action. We shall be throwing away an advantage if we neglect to keep all our sound ships in an effective condition, and as far as possible up to date. The leading authorities on naval policy in France take a much less contemptuous view of the value of our older material than is usually put forward by English critics. The French well know that the British ironclads of the earlier types, such as the Warrior or Agincourt, are vastly superior to the French ships of the same period built of wood. M. Weyl has expressed the opinion that with improvements our ships could be perfectly adapted to the requirements insisted upon for the armoured cruiser class.

Looking to the important commercial interests which would need protection in distant waters in the event of war, the compiler would urge that this service should be the appropriate sphere of our old ships modernised. The long ships of the first period of armoured construction should cover those trade routes where the coaling stations are divided by the greatest distances. In narrower waters, such as the China Sea and the northern route to Australia, the smaller ships, of the Audacious class, would do effective service.

Looking to the great resources we possess, through the conversion of our armoured battleships into cruisers, and looking to our already decided superiority in cruisers of the most modern type, for the

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protection of commerce, the decision recently taken by the Admiralty to throw their main efforts into construction for the line of battle should command approval.

Cruisers to act as look-out ships could certainly be improvised by taking up fast vessels of the mercantile marine.

V.

Cruisers.

Cruisers. Steam trials.

In reviewing the recent construction, and the vessels now in hand, for our own Navy and for foreign powers, in the cruiser class, we may ask ourselves whether the British types have proved in all respects successful. It is gratifying to find that Lord George Hamilton is enabled to give a favourable report of the recent trials on the measured mile. The Blake and the Vulcan have suffered from boiler troubles. The cause of failure being known, the remedy should at any cost be applied; our dearly-bought experience will secure us from a repetition of similar errors in design.

The later vessels share with their predecessors a defect, which is seriously felt in all subsequent service at sea. The measured mile speeds are obtained by tremendous mechanical effort. The engines rarely, if ever, indicate in practice the power obtained on the measured mile. It results that the speeds at sea are lamentably behind those obtained on the measured mile. The cause is not far to seek; we overburden our cruisers with armament, and the guns are carried at such a height above water as to render necessary a breadth of beam not favourable to speed, especially in blue water.

Greater length of French cruisers.

We may with advantage compare the French and English models. The *croiseurs à batterie*, Isly and Jean Bart, 4160 tons and 19 knots, have a beam of 43 ft. 6 in., and length 346 ft. Our Astræa class, 4360 tons, speed 19·5 knots, have a length of 320 feet, and beam 49 ft. 6 in. The greater proportion of beam to length has been a permanent characteristic of British designs. Our Archer class, 1770 tons, are 6·2 times their beam. The French Condor class, 1280 tons, are 7·6 times their beam. Our Bellonas, 1830 tons, are eight times; the French Troude class, 1880 tons, are ten times their beam. Our Medea class, 2800 tons, are 6·4 times; the French Davout type, 3030 tons, are 7·1 times their beam. Again, we have the Apollo class, 3400 tons and seven times; Suchet class, 3027 tons, 7·5 times their beam. Astræa class, 6·4 times; Friant type, 3720 tons, and 7·1 times their beam. Mersey, 4060 tons, 6·5 times; Isly, 4160 tons, and eight times their beam. Edgar, 7350 tons, and six times; Tage, 7045 tons, and 7·2 times their beam.

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On the proportions of length to beam, we have some valuable criticisms in the volume lately published by Captain Eardley-Wilmot. "It has," he says, "been customary to place a heavy gun as a bow chaser. This principle is exaggerated when guns of fourteen tons and upwards, aggregating with the carriage twenty tons, are placed in the fine bows of vessels of the Mersey type. The weight tells fatally upon the speed against a head wind and sea. The later cruisers carry at the bow and stern 6-in. 5 ton guns. These guns have a long range, and throw shells which would destroy any unarmoured structure. The Medea class would be much improved with a lighter armament. The Archer class are hampered by carrying six 6-in. guns."

We may conclude with some general observations. The functions of the cruiser class are to protect commerce and to attack an enemy's port by a *coup de main.*

Dimensions and coal endurance.

The French Council of the Admiralty have laid down as the main elements of efficiency in a cruiser—(I.) speed; (II.) ability to keep the sea in all weathers; (III.) ample coal endurance. To fulfil these conditions a displacement of at least 4000 tons must be accepted. Such vessels as the Forbin, 1800 tons, are merely *avisos de course,* and their range is limited to European waters.

The Secretary of the United States Navy, in his last report, observes, "The tendency of naval construction all over the world at the present time, in the matter of cruisers, is to the construction of large vessels. This is caused by the necessity of uniting in a single vessel a protective deck, sufficiently heavy to withstand the attack of the quick-firing battery of an adversary, high speed, and finally great coal endurance. For the San Francisco the coal supply was supposed equal to 8333 knots, and is actually 4120 knots. The distance across the Indian Ocean from the Cape to the Straits of Sunda is 5000 knots. The distance from San Francisco is 3982 knots to Callao, and 4880 to Yokohama. The limited range of the San Francisco is strikingly apparent from these figures. Russia leads the way with the armoured cruiser Rurik, 11,000 tons. England is completing the Blake and Blenheim, 9000 tons, and nine Edgars, 7500 tons. France is building the Dupuy de Lôme, 6000 tons, and seven more of this class are contemplated. Spain has ordered six armoured cruisers, three of 6900 tons. The fourth is increased to 9800 tons. The remaining two will probably be of the same dimensions." *

The United States Advisory Board in asking that cruisers

* Spain has six cruisers, building or completing, of 7000 tons; two second-class battleships of 9235 tons.—EDITOR.

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should have a speed of twenty-two knots, and insisting that guns' crews should be protected from quick-firing guns, laid down conditions which cannot be satisfied without going to large displacements.

Cruisers should be armoured.

In actions between battleships, Captain Long considers it probable, that a vessel might be put out of action in half an hour by quick-firing guns without armour-piercing guns coming into play. This opinion, he says, is held not only by the author of 'Modern Artillery,' but by Mr. White. If this view be sound, it does not seem expedient to expend large sums of money on cruisers complicated, and therefore costly not only in the construction of the hull, but in their machinery and armament, and yet without protection from quick-firing guns. It would seem the wiser policy to build fewer ships, but of sufficient displacement to carry armour for the protection of vital parts.

Dimensions of cruisers.

In treating of the battleships, the compiler has urged that some check should be put on the tendency to build only vessels of extreme dimensions. In the class of cruisers it seems a duty, on the other hand, to insist that we have gone far enough in building cruisers of a class which, from insufficiency of tonnage, cannot be protected by armour nor maintain a high speed at sea except in very favourable weather. For the general duty of cruisers, the Edgar class will always be found more satisfactory than any cruisers of the second class. For mere look-out duties the Medea class are too large. Captain Eardley-Wilmot holds that 2000 tons is sufficient for a despatch or look-out vessel. The need of a certain number of vessels of light armament but extreme speed, and with good coal endurance, has never yet been sufficiently recognised in our shipbuilding programme.

Torpedo transports.

The torpedo transport is a novel feature in the modern Navy. We began with the purchase of the Hecla, which has done the work required in a satisfactory manner. In a new and comprehensive programme of shipbuilding it was thought desirable to include a greatly improved Hecla. The Vulcan was designed for this service. The speed realised on the trials has been unsatisfactory, owing to failures in the boilers. The lines are graceful. The speed realised was 18·5 knots, though the indicated horse-power was 8200 instead of 12,000. The ship is well protected by compartments and a 5-in. deck. The Vulcan would have been a more valuable addition to the Navy fitted as a cruiser. As a torpedo transport she is too large and costly for the work she was designed to do. An American critic has condemned the cranes as "complicated, clumsy, and not well

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adapted to practical exigencies at sea, and most costly, as well as trying to the structure of the ship." Looking to the necessity which exists for reinforcing the Navy in other classes, the policy of building a ship of a costly type for the limited purpose of carrying torpedo-boats is open to question. The Vulcan is practically a non-combatant. Our requirements in battleships and armoured cruisers can only be met by special construction. Torpedo carriers could be improvised by the conversion of mercantile auxiliaries.

Value of sail-power.

Navigation under steam destroys confidence in the power of sailing vessels under those favourable conditions which are by no means rare. The quaint caravels of the Elizabethan era could do a good turn of speed with a fair wind. "I know it is true," says Sir Walter Raleigh, quoted by Admiral Colomb, "that a fleet of ships may be seen at sunset and after it at the Lizard, yet by next morning they may recover Portland." When Nelson was chasing Villeneuve for three months and thirteen days, he covered more than 7000 miles of sea, at 93 miles a day.

Compiler's experience.

In small vessels the compiler may claim no slight experience of the value of steam as auxiliary to canvas, and of canvas as auxiliary to steam. In the course of the present cruise, now drawing to a close—these lines being written some 700 miles S.W. from Ushant—the passage outwards to the West Indies was accomplished entirely under sail, at an average speed of 8 knots, with an intermittent trade-wind, rarely blowing briskly. On the return passage from the United States, with westerly and variable winds, the following runs have been made under sail, 281 knots, 259, 239, 162, 140, 200, 186, 186, 122, 185, 186; and now, in a long calm, we are steaming across the ocean at 9 knots, with a consumption of under five tons of coal per day. Up to the date of writing, the distance covered in the present voyage has been 7510 miles under sail and 3366 under steam.

Alabama.

It is a fallacy to suppose that the advantages of steam and sail cannot be successfully combined. The Alabama carried only eighteen days' coal. "With the exception of six prizes, all captures," says Captain Semmes, "were made with my screw hoisted and my ship under sail." The Alabama was a perfect steamer and a perfect sailing-ship. For any duty to be performed by the Navy for the protection of commerce south of the Equator and over the long expanse of the Indian Ocean, sails will be found of the greatest value in extending the coal endurance of our cruisers.

Compiler's recommendations.

Cruisers should be of two classes. Those designed for distant seas should have sail power with single screws. The combination of all

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the essential features of a fast steam cruiser with fair efficiency under sail, is not an insoluble problem. In time of peace, for the work of the Pacific Station and for visits to isolated islands for the relief of shipwrecked crews, sails are indispensable.

If we found ourselves *aux prises* with our neighbours across the Channel, the attacks on our commerce in distant seas would be made by ships such as the Tage, Sfax, and Cécille, having a considerable spread of canvas.

In urging that our cruisers should be rigged, it is not proposed that the masts and yards should be of the proportions seen in the Inconstant and Raleigh, or in the French Tourville. Having the advantage of more numerous coaling-stations, we may be content to use the wind as an auxiliary. As Admiral Colomb has observed, all other nations must, in attacking our trade-routes, reverse our propulsive policy. They must have great sail power, and their steam must be reserved for fighting purposes.

VI.

Machinery and Boilers.

Failure of boilers.

In the Statements of Lord George Hamilton, introducing the Estimates of the present session and those of last session, an important section is devoted to the steam trials of Her Majesty's ships. The subject is discussed with perfect frankness and full appreciation of the technical difficulties involved.

The cause of the mistakes which have been committed is now thoroughly understood. The boiler-power has not been equal to the engine-power. An attempt has been made to obtain an increase of power without an increase of weight by the use of forced draught, which has proved most destructive to the boiler tubes. The responsibility for these numerous failures rests with a former engineer-in-chief of the Navy, a man of ability, who had recommended a new type of boiler, before a trial had been made in any ship of large dimensions.

In matter of an essentially technical character, such as gunnery and machinery, the high parliamentary officials charged with the administration of the Admiralty, must necessarily be guided by professional advice. There is a natural reluctance to rely on the opinion of a single expert. Hence the tendency to appoint committees, which, while they offer the advantage of bringing together all the luminaries, have the disadvantage of slow and cumber-

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some procedure, and the yet greater disadvantage of making it impossible to fix responsibility on any single individual, in the event of failure.

Failures in French Navy.

The French Naval Administration has had its share of troubles in the failure of machinery, and they are traceable to the same cause which has brought about our own misfortunes. In France, as in England, complaints are urged that it is impossible to bring responsibility home to any individual. The original author of a design is in all cases required to refer it for approval to a committee; and the committee never allow a design to pass through their hands without alteration.

The Engineer-in-chief.

No private firm or commercial company has to deal with technical problems on so large a scale, and possibly the practice they follow may throw little light on Admiralty procedure. It is, however, certain that if the business of the Navy were administered on commercial principles, the salary paid to the chief engineer would be fixed at a scale which would command the highest talent and experience in the country. No man of eminence outside the service would accept the responsibilities which rest on the engineer-in-chief for the salary at present paid.

An officer holding a commission from Her Majesty will probably look for other rewards than those which the heads of a house of business have it in their power to bestow. If successful, he has the grateful appreciation of the whole country, and as the chief of a great service he holds a position of distinction which a man of ambition of the best kind cannot but be proud to fill.

VII.

Torpedo Cruisers.

History of torpedo construction.

The torpedo, though inferior to the gun as a general weapon, is an engine of war of tremendous power. Three distinct types of vessels have been built in the armament of which the torpedo is the principal weapon. They may be designated as torpedo cruisers, torpedo gunboats, and torpedo-boats. The cruiser is distinguished from the gunboat mainly by a larger displacement. In both classes there is a power of delivering at close quarters a deadly blow at a larger antagonist. The cruiser is more able to cruise independently than the smaller type.

The Germans began the construction of torpedo cruisers with the Zieten. Italy followed with the Pietro Mica. In 1882 Germany

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again resumed the construction of vessels of this type with the Blitz and the Greif, the latter being of 2000 tons and 23 knots. In 1885 France entered the lists with the Condor class, 1240 tons and 17·8 knots. England, as usual, was late in the field, and to make up for lost time vessels were laid down in batches, without sufficient experiment. Our Archer and Scout classes, of 1600 to 1770 tons, speed 17 knots, have been overweighted with armament. They are overcrowded with their complement, too large to act as torpedo vessels or torpedo catchers in combination with battleships, and too small and flimsy to be efficient as cruisers. They would be good look-out ships to a fleet, but for this purpose their construction need not have been so costly and complicated, nor would they require so powerful an armament as they now carry.

In the construction of the torpedo flotilla Italy has been working on lines not widely diverging from those which we have followed. The vessels of the Tripoli type, in all sixteen in number, having been found too slight, the Dogali type, more than twice as large as their predecessors, have been adopted. In these vessels the horse-power is out of proportion to the tonnage.

Torpedo cruisers have been built for Austro-Hungary by the Armstrong firm, and for Spain by Messrs. T. & G. Thomson.

The Secretary of the United States Navy gives the following as the essential characteristics of a torpedo vessel:—Small size; light draught; speed 22 knots; good coal capacity; armament; torpedo, and quick-firers. Such a type combines the ability to keep the sea of the gunboat with the speed and armament of a first-class torpedo-boat. It has many functions. Acting independently, it is a sea-going torpedo-boat, a commerce destroyer, or a blockade runner. To a blockading fleet its presence is indispensable. In action its duty is to destroy an enemy's torpedo-boats, to serve as a support to a torpedo-boat flotilla, and to act as a torpedo-boat itself.

VIII.

Torpedo Gunboats.

The introduction of quick-firing guns and smokeless powder has given to the battleships increased capabilities of defence, but the torpedo catcher, armed with numerous light guns, is still an indispensable auxiliary.

France led the way in designing a type for the special duty of protecting the heavy ships from torpedo attack. In 1886 the Bombe Recent types.

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class were laid down. They were not altogether successful, being found too light for the work they were required to do. Following the lead given by France, vessels of the Rattlesnake type were laid down for the British Navy. They, too, were found unsteady and not of sufficiently solid construction. To remedy these defects the Sharpshooters were designed, of a larger size. It is admitted that the advance in displacement has not been sufficient to secure an entirely satisfactory combination of the sea-keeping qualities with the various elements of fighting efficiency which would be found in the torpedo-vessel. A new class, named from the Halcyon, has been designed, of 1070 tons, and 19 knots speed. Five are to be laid down this year. With the increase of size we may look with confidence for greater efficiency. The torpedo gunboat offers a type of great utility, which should be more fully represented in the British Navy.

IX.

Torpedo-boats.

The proper function of the torpedo-boat in naval warfare is to protect the coasts. Bombardments are slow operations, and fleets engaging forts and batteries would be exposed to grave risk if attacked suddenly by large numbers of torpedo-boats, lying in sheltered positions and making a sudden rush upon an enemy in the offing. As a means of keeping off a blockading fleet at night, torpedo-boats would be most effective.

Types required.

Torpedo-boats are not adapted to accompany fleets in operations at a great distance from the coast. The sufferings of those on board during a long cruise at sea are intolerable. In torpedo-boats, as in all other types, with increase of size, greater efficiency can be secured. In the ten division boats built for the German Navy, having a displacement varying from 250 to 350 tons, the speed has advanced from 20 knots in the boats built in 1887 to 26 knots in those of the latest pattern. If dimensions can be increased to the 180 ft. of length and 18 ft. beam, which he proposes for his Channel patrol steamers, Mr. Donaldson guarantees a speed of 27 knots.

Torpedo-boats should be of two, perhaps three, classes :—

(I.) Displacement up to 350 tons, for patrol duty.

(II.) Not less than 120 tons, or large enough to keep the sea and act on the offensive, within a limited range, for the protection of a fort threatened by a hostile force.

(III.) Of 12 to 15 tons; for estuary and harbour defence.

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In quality of workmanship and in excellence of model, the British torpedo-boat builders have nothing to fear from foreign competition. The great firm of Schichau may be said to take the lead on the continent. Normand of Havre has built boats which have given satisfaction to the French Navy. All naval critics in France concur, however, in acknowledging that when they acquired the Coureur from Messrs. Thornycroft, they had nothing from their own builders of equal merit. We are fortunate in having three builders who are able to supply the Navy with boats of admirable design and construction. White's are recognised as good all round. The Yarrow boats have great speed, but are said to bury themselves in a seaway. Thornycroft's are very handy, but less strongly built than the other types.

Excellence of British construction.

The Admiralty have been criticised for their hesitation in the construction of the additional torpedo-boats, which are undoubtedly needed for the defence of our coasts and harbours. They have been reminded that the boats hastily ordered during the scare arising out of the Penjdeh incident were two of the more approved pattern. Arguments may be urged, which, in the opinion of the compiler, are conclusive, in support of the decision taken by the Admiralty to proceed with deliberation. The progress of invention is ceaseless. The best designs of 1892 will in a few years be condemned as obsolete. In now ordering ten boats, the Admiralty are making a valuable addition to the torpedo flotilla: while, on the other hand, by not proceeding too fast, they secure the advantage of further improvements for those ordered later.

Policy to be followed.

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CHAPTER III.

Navy Estimates.

In the present section it is proposed to give the main heads of naval expenditure on the British Navy, as proposed for the year 1892–93. Similar information will be given for the other naval Powers.

The estimated naval expenditure to be voted by Parliament for 1892–93 is £14,240,200, being an increase of £25,100 on the year 1891–92. In addition, the Admiralty have at their disposal, as explained by Lord George Hamilton, considerable unexpended balances.

Taking the principal votes in detail, wages and victualling aggregate £4,735,700, being an increase over 1891–92 of £185,900. The number of men voted for 1891–92 was 71,000. The number proposed for 1892–93 is 74,100. The vote for the Royal Naval Reserve is increased by £5900, to provide for an increase of 1800 in the Reserve force, and an alteration in the system of training the stoker class of that service.

The total expenditure on shipbuilding, in the dockyards and by contract, under the Navy Estimates and the Naval Defence Act of 1889, is £5,560,587. In the works vote, the total amount proposed is £448,000. The greater part of the increase, amounting to £30,400, is for dredging operations at Portsmouth, and the extension of the gunnery establishment on Whale Island. A commencement is to be made with the lengthening of the New Mole, at Gibraltar, the amount proposed being £5000. It will be noticed with regret that no provision is contained in the Estimates for the commencement of a graving-dock. Those who have been pressing for this work as an urgent necessity must take comfort from the promise for the future which is found in Lord George Hamilton's Statement.

The aggregate non-effective vote is £2,019,500. The large expenditure under this head remains practically the same as for last year.

We may now turn to foreign navies. The total amount of the

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French Naval Budget, as approved by the French Chamber for 1892, is £8,735,852. The votes for pay and provisions aggregate £2,540,000. The total amount of the shipbuilding votes, including armaments and repairs, is £3,691,000. Of this amount, £3,000,000, in round figures, will be devoted to new ships and their armaments.

The German Navy Estimates for 1892–93 amount to £4,795,570. The shipbuilding votes include Dockyard Expenses, £503,445, and building and armaments, £1,433,000. German naval expenditure has quadrupled since 1873.

For 1892 the Russian Navy Estimates reach a total of £5,320,000, of which £2,127,279 will be expended on construction. The Estimates of Russia have advanced by fifty per cent. in the last ten years.

In Italy, the Navy Estimates for 1892–93, brought in by the Rudini Cabinet, amount to £4,182,399. A reduction has been made, under the pressure of straitened finances, on the vote for stores. The expenditure on new construction is fixed at £1,080,000.

The building programmes of the several Powers may be shown in tabular form. That for the British Navy is fully set out in the Statement of Lord George Hamilton.

SHIPS BUILDING AND COMPLETING.

	Great Britain.	France.	Russia.	Italy.	Germany.
Battleships:—					
1st class . . .	11	7	8	4	4
2nd class and Coast-defenders . . .	2	4	2	2	8
Armoured Cruisers .	..	5	2	..	..
Under reconstruction .	7	..	..	..	..
Cruisers:—					
1st class . . .	10	3	1	1	5
2nd class . . .	19	7	1	6	1
Torpedo Cruisers . .	..	2	3	7	1
Torpedo Gunboats . .	10	3	2	..	2
Armoured Gunboats .	..	2	3	..	..
Torpedo Carrier . .	1	1	..	..	..

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Having made a comparison of our expenditure with that of other Powers, we are in a position to form some judgment as to the adequacy of the efforts we are making to secure for our country that naval supremacy on which the maintenance of the empire and its just influence in the world mainly depend.

It has been laid down as a standard by the Admiralty, with the approval and consent of Parliament, that our Navy should be equal to the combined forces of any two Powers. It is shown in the comparative tables, published in Part IV. of the *Annual*, that in first-class battleships we fairly hold our own. In second-class battleships we are relatively much weaker. In look-out ships we are up to the standard we have laid down, though our number, unless supplemented in war by mercantile auxiliaries, is by no means proportionate to our first-class battleships. In torpedo gunboats we are in a similar relative position. In coast-defence ships we are decidedly below our standard. In armoured cruisers we have eighteen ships, of 137,050 tons, as compared with thirteen ships, of 68,446 tons, in the French Navy, and nine ships, of 63,223 tons, under the Russian flag. To strengthen the fleet in this important class is an urgent necessity. As a first step, our older ironclads should be converted into cruisers.

In fast cruisers of the first class we have eleven ships aggregating 85,550 tons, against seven French ships, of 29,729 tons,* and one Russian ship of 5000 tons. In protected cruisers of the second and third class we have no less than fifty-one ships, aggregating 179,311 tons, against twelve French vessels, of 30,587 tons, and five Russian vessels, the aggregate tonnage of which is not known at present.

On the whole, our present strength in ships, reinforced as it has been by the greatly increased effort of recent years, cannot be considered unsatisfactory. The time has not yet come to relax our energies. We cannot stay our hand so long as other Powers, to whom a commanding position on the seas is not, as with us, a vital interest, continue to push forward construction with vigour.

Our total expenditure on building and armament, as proposed for 1892–93, is approximately equal to the combined expenditure of France and Russia. With the resources now being placed at their disposal, the Admiralty will not allow the British Navy to fall below the standard which it is our fixed determination to maintain.

The policy of a considerable further expenditure might be advocated if it could be anticipated that other Powers would stay their hand while large reinforcements were being added to the British Navy.

* The tonnage of the new ship is unknown.

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Experience teaches that we shall not be allowed to expand without efforts being made elsewhere to keep pace with the forward movement on this side of the Channel. If we give the lead, we are certain to be followed by other Powers to the utmost limit of their resources; and we have at least one rival endued with a truly astonishing power of bearing taxation.

The expenditure on the French Navy has advanced by leaps and bounds. In the course of a speech in the Chamber, M. Barbey, the Minister of Marine, gave the expenditure on construction at £2,280,000 for 1890, £2,480,000 for 1891, and £3,000,000 for the present year. M. Menard Dorian, a former reporter for the Committee on the French Navy Estimates, expressed an opinion that the amount now being voted for the Navy had reached a limit which it was impossible to exceed. However this may be, every statesman will shrink from engaging in a rivalry of expenditure on armaments, which could only be justified by imperative necessity. This is not an argument for standing still while others are advancing. Happily the strength of Great Britain as a naval power does not consist wholly in her fleets of warships. Above and beyond the expenditure under Navy Estimates, we have a means of adding to our strength by judiciously utilising the resources which are always ready to our hand in the maritime trade of the country. Our vast mercantile marine, while it makes a strong Navy a necessity, is also the main source and foundation of our strength. Outside the Navy we have establishments for shipbuilding, and reserves of men for manning a fleet, incomparably superior to those which any other naval administration can command.

The recent changes in the *matériel* of our Navy have been in our favour. The power of reinforcement, as Vice-Admiral Armijon well remarks, depends no longer on the numbers of the coast population, nor on the forests from which the materials of construction were formerly drawn, but on the production of mines of iron and coal, and on the skill of the industrial population; and of these things England possesses abundantly.

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